THE HISTORY

OF THE

QUEENSLAND

MAIN ROADS COMMISSION

DURING

WORLD WAR II

1939 - 1945

J. E. ENGLAND ESQ

THE HISTORY

of the

QUEENSLAND

MAIN ROADS COMMISSION

during

WORLD WAR II

1939 – 1945

A. H. TUCKER Government Printer, Brisbane.

TABLE OF CONTENTS.

COMMISSIONER OF MAIN ROADS,
BRISBANE, 29TH JUNE, 1949.

HON. J. LARCOMBE, M.L.A.,
TREASURER,
BRISBANE.

Dear Mr. Larcombe,

I have pleasure in transmitting this document dealing briefly with the development of the Queensland Main Roads Organisation prior to September, 1939, and more fully with its subsequent expansion and work during the War, in Queensland and some adjacent territories.

The Main Roads Commission was the chief agency in carrying out the Commonwealth Government war time defence works for the Allied Works Council presided over by the Director-General, the Hon. E. G. Theodore, with myself as Deputy Director-General for Queensland.

It is a plain unvarnished record of achievement of which the Government Officers of the Department and Workmen may feel proud and I, therefore, recommend that it be printed.

Faithfully yours,

Commissioner of Main Roads.

FOREWORD.

As Minister in Charge of Main Roads activities, I have pleasure in accepting the invitation, which was extended to me in June, 1949, *by the then Commissioner of Main Roads (Mr. J. R. Kemp), to write a Foreword to this important document intituled "The History of the Queensland Main Roads Commission during World War II,* 1939-1945."

The document constitutes an interesting and informative record of the work of the Main Roads Board and of the Main Roads Commission which succeeded it. This work has transformed Queensland in several ways; it has covered the State with a net-work of Highways and Main Roads which have conduced to greater development, settlement, and production; and also to smoothness, safety and economy in road transport.

The growth of the activities, and the extent of the valuable services, of the Main Roads organisation may be inferred from the fact that, in 1921-22, *the expenditure of the Board was only* £38,700 *but, in* 1948-49, *under the Commission, the disbursements were* £3,561,300. *Further, the results of the improvement in the condition of Queensland roads, and of the increased settlement and production in the State, are indicated by the fact that in* 1949 *the number of motor vehicles registered was* 186,670 *as compared with only* 13,800 *in* 1922.

The work of the Commission during the World War period (1939-1945) was *vital and valuable. As the document states, when the Commonwealth Government called upon the Queensland Government to assist in the war effort the Main Roads Commission was the State instrumentality best equipped by organisation and experience to undertake the major portion of the work.*

The Commissioner of Main Roads, who was also Co-Ordinator General of Public Works (Mr. J. R. Kemp), was appointed Deputy Director-General of Allied Works, Queensland, to assist the Hon. E. G. Theodore, who was Director-General of Allied Works for the Commonwealth. One could not do justice to the remarkably capable, devoted and successful work of these two officers without appearing to exaggerate. The nation owes them much, indeed, for their great services, which were rendered in an unassuming manner. And in writing thus I do not overlook the magnificent services of other officers associated with Messrs. Theodore and Kemp, and of every worker who joined in the war effort under consideration.

The statement reviews and preserves valuable war-time records. It outlines the extensive plans of the Main Roads Commission for war requirements, which were quickly and satisfactorily promoted and faithfully executed. The Commission was engaged during the war period in Allied Works Council operations and the magnitude of that work may be gauged from the fact that in the two years 1942-43 *and* 1943-44 *over* £22,000,000 *was disbursed on account of the Commission's activities as well as those of the Allied Works Council.*

The document reveals the nature of the projects undertaken and the details of the vital work carried out, including the construction of Defence roads; the building of Aerodromes; the erection of Fortification works; the construction of a fine Graving Dock; the carrying out of Railway works and the promotion of Defence works generally.

Truly, the compilation is a wonderful story of successful achievement in relation to Main Roads development in Queensland, and in regard to the supremely important work carried out, under difficult conditions, in the defence of our nation. I am delighted to have the honour of writing this preface to a document which provides a permanent record of work and service which should please and inspire every Australian citizen.

22*nd August,* 1949.

AT THE OUTBREAK OF WORLD WAR II.

Governor: His Excellency Sir Leslie Orme Wilson, G.C.S.I., G.C.M.G., G.C.I.E., D.S.O.

Lieutenant Governor: Hon. Sir James Blair, K.C.M.G., C. J.

THE MINISTRY IN QUEENSLAND.

Premier and Chief Secretary: Hon. W. Forgan Smith, LL.D.

Secretary for Public Lands: Hon. P. Pease.

Attorney-General: Hon. J. Mullan.

Secretary for Agriculture and Stock: Hon. F. Bulcock.

Treasurer: Hon. F. A. Cooper.

Secretary for Health and Home Affairs: Hon. E. M. Hanlon.

Secretary for Labour and Industry: Hon. T. A. Foley.

Secretary for Public Works and Public Instruction and Minister in Charge of Main Roads Activities: Hon. H. A. Bruce.

Minister for Transport: Hon. J. Larcombe.

Secretary for Mines: Hon. D. A. Gledson.

SENIOR MAIN ROADS OFFICERS DURING THE WAR YEARS.

Commissioner—Mr. J. R. Kemp, M.I.C.E., M.I.E.Aust.

Professional Staff—

Mr. D. A. Crawford, Chief Engineer.

Mr. A. R. Williams, Deputy Chief Engineer (also Commonwealth Controller of Materials).

Mr. D. J. Garland, Bridge Engineer (on War Service 1940-1945).

Mr. J. R. Dickson, Acting Bridge Engineer, 1940-1945.

Messrs. G. F. Campbell Brown, C. H. Paterson (resigned 9th November, 1944), R. J. Hicks (Chief Executive Officer, Plant and Mechanical Equipment, Allied Works Council; resigned 18th December, 1945), J. M. Fraser, W. J. Young (resigned 13th December, 1945), C. M. Calder (resigned 31st October, 1944), E. G. Guthrie (on War Service 1941-1943), J. C. Mathison, E. W. Hogan—District Engineers.

Messrs. K. E. Paterson, H. H. Hull, H. A. Lowe, D. S. Hall, R. S. Dale, H. G. Perkins, R. G. Jennings, C. R. Rickard, F. G. Vidgen (on War Service 1941-1946), C. H. Wilson, O. F. Anderson, C. C. Day, F. C. Lord, A. J. Bond, R. B. McIntosh, R. D. Gallop, W. S. B. Drake, A. S. Ponting, F. S. Parkes, R. I. Inglis, J. S. Robertson, R. W. Boys, R. N. E. Kemp, T. Middleton, E. L. Richard, R. Wilson, G. G. Nutt, J. Kindler (seconded from the Bridge Staff of the Co-ordinator-General), W. R. Steele, S. W. Bettridge, J. Dow, W. Mortensen, G. W. Pheasant, G. A. Griffiths, C. T. Bird—Engineers.

Mr. H. Maltman, Mechanical Engineer (seconded to Munitions Department 1941-1946 as Senior Engineer, Board of Area Management, Queensland).

Mr. F. H. Wedd, Assistant Mechanical Engineer (Acting Mechanical Engineer 1941-1946).

Mr. L. V. Wilkinson, Resumption Officer.

Mr. L. G. Walker, Location Officer.

Messrs. L. F. Bardsley, F. Deighton, R. B. Bunnett, R. D. Wearne, E. G. Sheldon, L. Harrod, J. O'Dwyer, O. Meredith, H. M. Carr, N. Ashwin—Surveyors.

Messrs. W. G. Grauf and J. Gausden—Plant Inspectors.

Messrs. O. C. Bond, G. Brindell, L. H. Britton, J. Campbell, W. P. Foster, D. Hyde, G. Jesser, S. Jones, S. Kennedy, W. E. Kelly, H. McClelland, W. J. Robinson, J. J. Shipp, J. Simpson, C. N. Thorley, H. C. Tindale, R. B. Warfe, C. Winkley—Foremen and Overseers.

Messrs. J. S. Cochrane (Beaudesert Shire), A. M. Black (Hinchinbrook Shire), T. E. Peters (Nerang Shire), E. N. Wilson and R. Hope (New South Wales)—Local Authority Engineers.

Collaborators—

Mr. W. H. R. Nimmo and Staff of the Stanley River Works Board in connection with the Brisbane Graving Dock.

Mr. J. Holt and Staff in connection with a number of projects.

Mr. R. S. Binns, Engineer, Department of Main Roads, New South Wales, and staff in connection with the Inland Defence Road.

Administrative, Accounts and Clerical Staffs—

Mr. J. E. England, Secretary (services made available to Commonwealth as Commonwealth Controller of Liquid Fuel 1940-1943 and Chief Administration Officer, A.W.C., Queensland, 1943-1944).

Mr. L. J. Feenaghty, Assistant Secretary (Acting Secretary 1940-1944).

Mr. H. Buckle, Accountant-in-Charge 1943-1944, Chief Accountant 1944-1948.

Mr. J. A. Sabine, Accountant.

Mr. G. B. Carney, Sub-Accountant, in charge Civil Constructional Corps Allotments Section.

Mr. A. J. Anderson, Officer-in-charge, Registration Branch (resigned 30th April, 1942).

Mr. W. J. Clark, Records Clerk 1939-1942, Chief Clerk and Industrial Officer 1942-1947.

Mr. W. A. Rogers, Private Secretary to Commissioner and Branch Secretary, Allied Works Council, Queensland.

Mr. R. J. Wrench, Secretary's Branch.

Mr. F. C. Francis, Stores Supervisor and Supply Officer.

Mr. G. F. Smallcombe, Acting Officer in Charge, Registration Branch (died 15th Feb., 1945).

Mr. W. E. Vorpagel, Supervising Clerk in Charge, Northern Division 1943-1944.

Messrs. A. R. Walls 1939 (died 29th June, 1947); W. P. Hunter 1939-1942; W. A. Brown 1944; E. W. Brampton 1945; A. W. Devereux 1942-1944; H. Boles 1941; T. L. Stevens 1943; J. H. Frawley 1943; G. Potts 1944—Clerks in Charge of District Offices at Rockhampton, Townsville, Cairns, and Mackay.

THE FOLLOWING MEMBERS OF THE STAFF OF THE COMMISSION SERVED IN THE UNIFORM SERVICES DURING WORLD WAR 2.

(This does not include Wages Employees, very many of whom joined the various services.)

MALE OFFICERS.

Navy.

Begg, P. E.
Butcher, J. W.
Crowe, W. L.
Hamilton, L.
Herd, R. J.
Hicks, B. J.
Hodgkinson, R. W.
Madden, J. W.
Menzel, C.
McCart, N. C.
O'Neil, A. L.
Perkins, R. P. C.
Secomb, W. J.
Sheedy, J. A.
Skoien, D.
Watkins, R. D.

Army.

Abbiss, T. J.
Abbott, C.
Anderson, T. P.
Berglind, R.
Brampton, E. W.
Boorman, J.
Brownsdon, D. D.
Bunning, H. P.
Bush, A. F.
Cardwell, H. C. B.
Carroll, G.
Clark, J. T.
Clarke, H. V.
Clifford, J. H.
Clinch, L. R.
Cock, W. J.
Currey, G. D.
Daly, M. J.
Davis, M. H.
Day, N. J.
Delroy, F. G.
Eadie, W. F.
Evans, R. C.
Fell, E. F.
Ferrett, C.
Forrest, V. P.
Fraser, C. J. R.
Fraser, J. H.
Fraser, L. G.
Garland, D. J.
Grant, A. K. S.
Greenfield, H. V.
Grigg, H. C.
Guthrie, E. G.
Hannam, H.
Harding, C. H. V.
Haigh, D.
Harris, N.
Hartshorn, R. F.
Henry, L. DeW.
Hill, J. A.
Hilless, A. J.
Hunter, F. J.
Husband, D. M.

Army—continued.

Jensen, D.
Jiear, D.
Kearney, G. F.
Kellar, W. J.
Kelly, K. J.
Lenton, E. T.
Loveday, J.
Martin, C. G.
Miller, N.
Moody, J. A.
Morris, W. J.
McBow, A. L.
McGinley, J. F.
McHugh, P. D.
McKenzie, J. R.
McLean, J. M.
Neiht, L. G.
North, G.
O'Dwyer, V.
O'Malley, K.
O'Reilly, E. J.
Owen, J. G.
Rains, C.
Rayment, K. E.
Roper, T. L. G.
Ryan, C. D.
Seto, D.
Silk, S.
Skehan, B.
Skehan, T. K.
Skinner, W. J.
Slater, C. W.
Stimson, L. W.
Stoneham, J. W. T.
Stuart, J. E.
Sullivan, P. J.
Thomas, W. T.
Verney, G. L.
Vidgen, F. G.
Wearne, R. D.
Whale, C. J.
Whimp, A. E.
Williams, L. P.
Wooster, H. M.
Wyche, P.

Air Force.

Abbiss, S. H. T.
Andrews, D. G.
Arnold, W. O.
Archer, I. A.
Barron, N. J.
Bastin-Byrne, C. E.
Blond, N.
Bookless, J. H.
Brimson, N.
Brooks, J. L.
Batts, B.
Carpender, J. F.
Casey, O. J.
Chick, D. G.
Dearness, C. D.
Dick, T. J.

Air Force—continued.

Ellis, K. W.
Evans, D. G.
Feldman, R. M.
Fisher, A. G.
Fleming, N. A. T.
Forbes, R. E. A.
Furlonger, T. K.
Gipps, R. DeV.
Goddard, A. H.
Greer, W. J.
Grimes, E. J.
Harrington, K.
Hicks, D. R.
Hogben, M.
Holzheimer, H.
Howe, A. J.
Jones, M. K.
Kelly, J. J. A.
Kenyon, C. R.
Kneeshaw, H.
McClelland, C. W.
MacDonnell, L. W.
McFadyen, N. J.
MacGinley, J.
McGinley, B. J. D.
McIntosh, J. R.
McLean, L. T.
May, D. J.
May, W. H.
Mercer, J. F.
Milton, A. G.
Moore, R. R.
Morgan, O.
O'Brien, E. T.
Ockenden, P. O.
Parsons, A. S.
Paterson, A. C. H.
Pease, J. A.
Perkins, R. A.
Philp, A. H.
Pope, R. K.
Price, C. W.
Quinn, L. L.
Quodling, P. W.
Richard, E. L.
Rigby, E. A.
Rosenberg, J.
Sheehan, W. J.
Stanton, E. A.
Stenhouse, R. C.
Stevens, R. J.
Summers, M. M.
Talty, M. L.
Thomas, D.
Thomas, T.
Thurecht, L. E.
Tracy, L. P.
Vellnagel, J.
Wallwork, P. J.
Williams, G. M.
Williams, W. F.
Whitehouse, L. N.
Wright, R. P.
Young, D. G.

THE FOLLOWING OFFICERS LOST THEIR LIVES ON SERVICE.

Barron, N. J.
Berglind, R.
Brooks, J. L.
Carpender, J. F.
Davis, M. H.
Fleming, N. A. T.
Hicks, D. R.
Morgan, O.
Thomas, T.

FEMALE OFFICERS.

A.W.A.S.

Hawken, J. M.
Jones, M.M.

W.A.A.A.F.

Camp, A.
Filer, G.
Gaw, M.
Gleadell, M.
Hall, O.
Kelly, O.
Patterson, A. B.
Roche, N. D.

CHAPTER 1.

THE DEVELOPMENT OF THE MAIN ROADS COMMISSION PRIOR TO SEPTEMBER, 1939, AND ITS SUBSEQUENT EXPANSION FOR WAR REQUIREMENTS.

The first Main Roads Board was constituted under "*The Main Roads Act of* 1920," which was placed on the Queensland Statute Book in October of that year. The Chairman (Mr. J. R. Kemp) and members (Messrs. J. A. Fraser and D. A. Crawford) were appointed shortly after. The first meeting was held on 1st February, 1921, and the Board promptly commenced to function as a constructional organisation. At the beginning of July, 1921, motor vehicle registration was brought under the control of the Board. By 30th June, 1922, 13,807 vehicles were on the register and the revenue collected was £46,228.

For the year 1922-23 the Board was able to report that 2,545 miles of road had been gazetted, work had been carried out on 163 miles and was in progress on a further 62 miles. The year's expenditure under all headings was £331,600.

The activities of the Board increased each year, the types of roads controlled by the Board were widened, and by 1939 developmental roads, tourist roads, State highways, secondary and mining access roads and tourist tracks had been progressively provided for by amendment of the Act.

In 1925 the Board of three members was replaced by a Commissioner and Mr. J. R. Kemp was appointed to that office. The field of operations was also extended by providing for the construction of what has been termed Farmers' Roads, making essential provision for the occupants of farming properties not otherwise accessible.

In 1938 the State Development and Public Works Organisation Act was passed by the Queensland Parliament for the purpose of improving the general economic welfare of the State and to encourage employment generally by the institution of a planned system of Public Works. Under this Act Mr. J. R. Kemp was appointed to the position of Co-ordinator-General of Public Works, an office which did not involve any relinquishment of his position as Commissioner of Main Roads though it necessarily involved placing additional responsibilities on the senior officers of the Commission.

From a very small beginning the Main Roads Commission organisation had by 1939 grown to a State-wide activity with offices in Brisbane, Rockhampton, Mackay, Townsville, and Toowoomba and with a staff of 318 males and 85 females. Disbursements for 1938-39 were £2,920,523, of which £2,301,000 was expended on permanent works and the maintenance of 14,863 miles of road of all kinds, while the revenue amounted to over £2,840,000, of which £819,267 was received from motor vehicle registration.

When the Commonwealth Government called upon the Queensland Government to assist in the war effort the Main Roads Commission was the State instrumentality best equipped by organisation and experience to undertake the major portion of the work. The State Government accordingly agreed that the whole of its constructional forces should be made available to the Commonwealth under the direction of the Co-ordinator-General of Public Works, who was in May, 1942, appointed Deputy Director-General of Allied Works, Queensland, to assist the Hon. E. G. Theodore, who was Director-General of Allied Works for the Commonwealth. In this way the control and co-ordination of the war effort was smoothly established.

Complete lines of communication were available as between the Queen street office of the Deputy Director-General of Allied Works and the Main Roads Commission offices so that the Deputy Director-General was able to discuss continually all matters relating to the work of the Co-ordinator-General's Department with the officers who were not transferred to Allied Works.

The sudden and extensive expansion of Main Roads Commission operations necessitated a greatly augmented staff of engineers, surveyors, draftsmen, as well as administrative, accounts, and field clerical officers. Many of the more senior and experienced officers joined the Armed Services or were seconded to Federal Departments and the acquisition of suitable staff was a matter of no little difficulty. However, with characteristic energy and with the enthusiastic co-operation of the staff and other Departments the Main Roads Commission shouldered the task placed upon it and as details in the chapters which follow show, it answered every demand made upon it.

It will be noted that not only did the Commission have to expand its existing organisation to meet increased work but it had to undertake at very short notice duties which it had never before been called upon to perform. Thus the responsibilities associated with plant and materials supply for the Allied Works Council in its early stages were carried out by or under the control of Main Roads Commission officers. The whole work connected with the organisation and operation of the Allotments Section of the Allied Works Council was performed by the Commission's officers and, as details contained later in this history show, it grew to very large proportions.

Even before the Allied Works Council was constituted, the Commission had, as early as October, 1940, made its whole administrative resources available to assist in the launching and operation of liquid fuel rationing. The Registration Branch personnel, including many senior officers, were made available for this

work and the files for the various registered motor vehicles were used to file Fuel papers, thus saving the Liquid Fuel Board the trouble and expense of setting up a separate record system. The facilities of the Accounts, Despatch, Stationery, and other branches and sections were made available readily to the Fuel Board and these services continued throughout.

Senior officers' services were made available either on a part or whole time basis for the purpose of carrying out Commonwealth functions. These included the Secretary, who in June, 1940, became the first Controller of Liquid Fuel for all Australia; the Mechanical Engineer, who was seconded to Munitions Department; two District Engineers and several others.

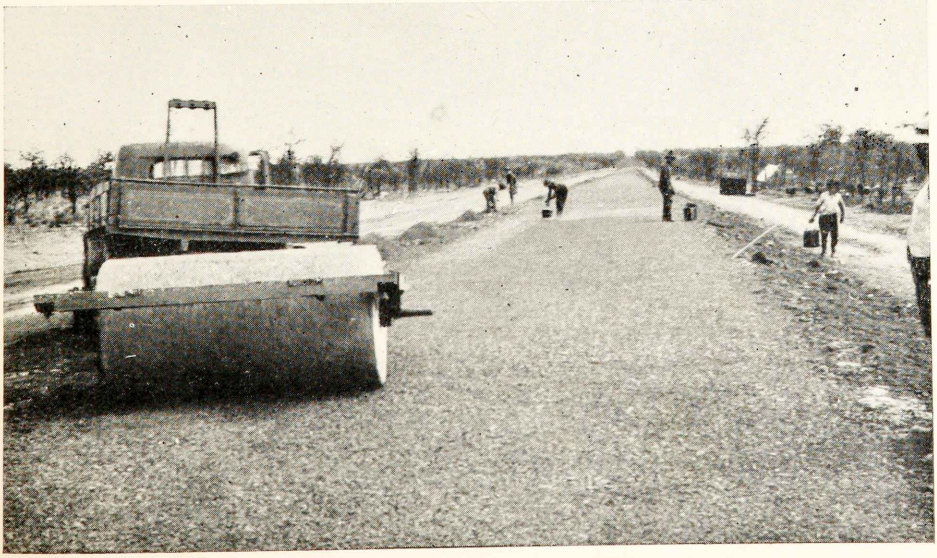
The increased and expanded operations resulted in the growth of the staff from the pre-war 403 to a peak in May, 1944, of 1,075. The expenditure rose from the 1938-39 figure of £2,920,523 to the huge amount of £13,836,837 in 1943-44. To make all this possible extra District or Sub-offices at Cairns, Herberton, Dalby, and Mareeba were opened and additional accommodation had to be secured in Brisbane, where a three-storied building adjoining Head Office was leased and additional temporary buildings were erected.

When the Allied Works Council commenced to function on 1st February, 1942, the Queensland Government decided that it would continue to bear the salary and other costs of the Main Roads Commission then being paid, although the Commission would be engaged to an ever-increasing extent on works for the Allied Works Council. Any additional costs for staff or services incurred by reason of such works were charged to the Commonwealth. Where any job, such as road improvement or maintenance, covered work that would have been necessary to meet ordinary requirements the cost, up to that point, was borne by the Main Roads Commission and expenditure over and above that amount necessary to meet Defence needs was charged to the Commonwealth.

The progress of the war may be followed by the following figures showing disbursements by the Main Roads Commission from year to year in connection with Defence work, including the purchase of plant and material:—

	£
1939-40	284,000
1940-41	303,064
1941-42	2,197,000
1942-43	10,576,000
1943-44	12,001,000
1944-45	2,378,099
1945-46	721,174
1946-47	17,039
Total	£26,099,277

Graders assembled at Mt. Isa ready to commence their 590 mile journey to Newcastle Waters.



Causeway 5,800 feet long at Newcastle Waters under construction. Water from about 4,000 square miles drains through this waterway.

CHAPTER 2.

INLAND DEFENCE ROADS.

TENNANT CREEK-BIRDUM.

Apart from aerodrome construction, the building of roads comprised perhaps the major part of the Commission's war effort. The work ranged from the construction and maintenance of important strategic roads to the building of access roads to defence installations of all kinds.

The strategic roads were, in the main, major undertakings involving concentrated work, often under difficult conditions, over long periods. In some cases non-refugee enemy alien labour (mostly Italians) was used to assist.

The access roads were many and varied, and often had to be camouflaged so that the installations to which they led would not be revealed by the presence of the road. Unfortunately, owing to the period of pressure during which the work was carried out, there are no adequate statistics available as to the total length of roads completed.

Some of the major projects were Tennant's Creek-Birdum (108 miles constructed by Commission); Mount Isa-Tennant's Creek (402·5 miles); Ipswich to Charters Towers via Duaringa and Clermont (882 miles, of which the Main Roads Commission built the section from Ipswich to Duaringa—476 miles); Charleville-Blackall road (187 miles); Atherton Tableland roads (200 miles approximately). A stretch of 230 miles from Eidsvold to Duaringa was built by the Main Roads Commission prior to the war.

As the Tennant's Creek-Birdum road was the first major defence undertaking by the Commission, and as the job was located in difficult country in the Northern Territory, somewhat fuller details will be given than will be the case for subsequent works. The job was outside Queensland, and involved unusual organisational and constructional problems.

On 25th July, 1940, the Army asked the Commissioner of Main Roads for earnest co-operation in both plant and personnel to build a section of the road for military purposes in the Northern Territory. The approval of the State Government to the Main Roads Commission undertaking the work was obtained and immediately inquiries were made from members of the staff and various other people familiar with conditions in that area as to what could be expected in the way of soils, gravel or metal supplies, class of timber, water supplies, &c.

In this connection, valuable information was given by Mr. Toyer, then Chief Engineer of the Department of Main Roads, New South Wales, following his rapid reconnaissance of the area. Major Dixon, of the staff of the Director of Works and Engineer Services, Melbourne, also supplied the State with much useful information, and acted as liaison officer between the Army and civil authorities.

Conferences were held with the New South Wales and South Australian authorities, who were also to co-operate as the available time for construction was so short. It was decided that to meet the Army requirements of providing a serviceable road for use through the wet season, the road would be cleared, formed, and drained throughout, but that gravelling would be limited for the time being to bare necessities.

These ready exchanges of information and mutual help between the States, clearly demonstrated the value of the liaison established over recent years by means of regular conferences of Interstate Road Authorities, Institution of Engineers, Aust., &c.

The Army required to be able to maintain road transport from Alice Springs, the northern terminus of the railway from Adelaide, to Birdum, the southern terminus of the railway from Darwin. About half this length, i.e., from Alice Springs to Tennant Creek, had already been progressively improved by the Commonwealth authorities; the other half, from Tennant's Creek to Birdum, was a mere track impassable in the wet season.

South Australia was allocated the southern section as this was situated closest to that State; the northern section was allocated to New South Wales, which State proposed sending its organisation and plant by sea to Darwin and thence by rail to Birdum; the central section of 90 miles was allocated to Queensland, this State having rail access to Mount Isa, about 566 miles to the east. Subsequently, on 4th November, 1940, in order to expedite the completion of the job as a whole, the Queensland organisation was asked by the Army to extend its operations southwards to effect a junction with the South Australian work, thus making the Queensland section of the through route 100 miles in length.

In addition, branch roads were constructed to connect Newcastle Waters township, the existing track to Camooweal in Queensland, and also No. 7 bore, which provides water in an otherwise dry length of 40 miles. The total mileage thus built by Queensland was 108 miles.

Topography, Vegetation, and Climate.

The country traversed in the Queensland section falls into three classes; the southern end follows the Ashburton Range, which comprises rough quartzite ridges with loose sandy loam between and lightly timbered with wattle, gum, and bloodwood of rather stunted growth.

The central section is a fair red sandy loam, with bauhinia and box trees, which merges into a sandy loam section covered in dense low wattle scrub with turpentine and small gum trees at intervals.

The third section is generally hard gravel or gravelly loam ridges with low scrub and bloodwood for 7 miles, and thereafter, lancewood, bullwaddy, and bloodwood forest. In this section there are flooded areas at Newcastle Creek, Sturt Plain, and Milner's Lagoon, with heavy black soil. Gutta percha timber, which is reputedly poisonous, grows thickly in the Newcastle Creek waterway.

The northern 50 miles also has a great number of anthills up to 6 feet in height. Recurrent growth of these is one problem in road maintenance. The country is grassed throughout with spinifex and some wire grass on the sandy southern portions, Mitchell grass on the flooded plains and rough grasses, mainly wire and spear grass, in the forest on the northern section.

The only surface water on the whole section was found in Lake Woods, 6 miles to the west of the new road, a few waterholes in Newcastle Creek, and small temporary lagoons at Frew's Pond and Johnstone Lagoon. Water for stock is provided by bores equipped with windmills, at about 26-mile intervals on the stock route north of Newcastle Waters township.

The area falls within the 10 to 15 inch average rainfall belt. The generally well-defined wet season is from December to March, but falls at other times occur. The evaporation is high in the summer, reaching 12 inches per month; in the winter this falls to 4 inches per month. The shade temperatures in the summer reach 115 deg. F., but in the winter nights drop to 40 deg. F.

Organisation and Construction.

As the Army requested that the work be completed within 120 days, the organisation was planned on a basis of 90 days to allow for any unknown factors. Approximate quantities of the work to be done were drawn up from the scanty information available; from these quantities, estimates of the requisite amount of plant and personnel were made.

Details of this preliminary organisation were under the control of the Deputy Chief Engineer, who was responsible to the Commissioner, and was assisted by another senior engineer of the Commission.

The urgent release and collection of staff and plant necessary for this special work involved considerable internal rearrangement of the Commission's routine functions. The Commissioner (Mr. J. R. Kemp, M.Inst.C.E., M.I.E., Aust.), and also the Chief Engineer (Mr. D. A. Crawford, M.I.E.Aust.), were naturally closely associated with all these preliminary arrangements. The staff comprised an engineer in charge, with two assistant engineers, one mechanical engineering officer, one surveyor, one draftsman, one senior clerk and paymaster, and assistant clerks.

Until actual conditions could be ascertained, provision was made for four gangs with a foreman in charge of each. Clerical assistance was provided to each foreman so that individual progress, quantities, and costs would be kept up to date for the information of the Engineer in Charge. These individual reports were to be consolidated in the headquarters camp.

As the Northern Territory Award did not envisage works of this type and magnitude, it was necessary to draw up subsidiary conditions of employment, rates of pay, &c. The Queensland Department of Labour co-operated in securing labour for the job. The foreman, gangers, and plant operators were selected from the various routine jobs in hand at the time, but ordinary labour was selected in the usual way, through the Labour Exchanges, from the registered available unemployed.

The only means of communication from Queensland other than specially arranged road transport was by means of the weekly air mail service or by telegram via South Australia. The capacities of these services were very limited.

Transport to the Job.

This was divided into two main sections—

(*a*) Items which were sufficiently mobile were sent by rail to Mount Isa then overland by road to Newcastle Waters. (Mount Isa is 1,435 miles by rail from Brisbane; Mount Isa to Newcastle Waters is 566 miles by bush track.)

(*b*) Plant which was unsuited for long distance road transport either by reason of size or type.

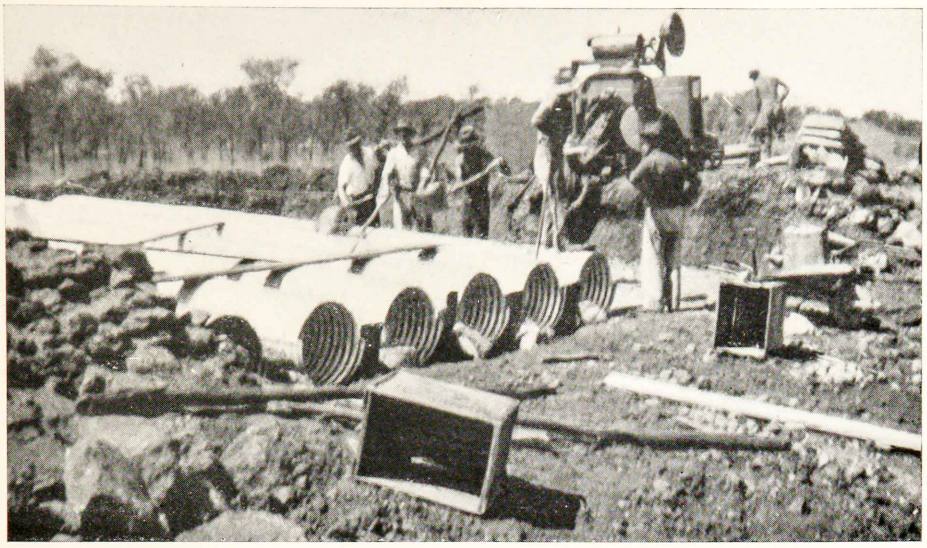
This latter equipment was sent round by boat to Darwin, then by rail to Birdum and finally about 150 miles by road from Birdum to the Queensland headquarters.

To handle the transport from Mount Isa across to the job, an engineering officer left Brisbane on 22nd August and arrived at Mount Isa on 26th August. He proceeded with an advance party on 27th August to pick up details of the road across to Newcastle Waters, ease bad creek crossings, select bivouac sites, find water and wood supplies and arrange fuel depots, &c.

The Engineer in Charge left Brisbane by road on 22nd August and arrived on the job at 1 a.m. on 29th August, a journey of about 1,840 miles. Travel by road gave greater speed and also enabled running in and servicing new vehicles before leaving established garages in Queensland. It was arranged that the Engineer in Charge would inspect the site, locate sections of the route and, with the aid of the advance party from Mount Isa, establish camps before the arrival of the main body. A main and two subsidiary camps were established.

The main force was divided into two convoys, the first comprising foremen, the majority of the plant operators, clerical staff, most of the supplies, special road plant, and sufficient trucks to transport the party. The second convoy to follow later consisted of further trucks and the majority of the labouring staff. It was also arranged that further trucks and men would be sent over if required.

The conveyance by rail of such a concentration of bulky plant involved special effort on the part of the Railway Department. Ready co-operation was forthcoming and



Placing metal pipes under the Newcastle Waters Causeway.

Convoy crossing Newcastle Waters Causeway during flood.

Part of the formed road.

special trains arranged. Fifty-three rail wagons of material, in addition to passenger accommodation and meals, were provided.

The first convoy left Brisbane on 1st September, arrived at Mount Isa on the 5th, left on the 6th and arrived on the job on the 10th. The second left Brisbane on 12th September and arrived on the job on 20th September.

The road men, from engineer to labourer, felt justly proud of the imposing cavalcade drawn up for the start of the 566-mile overland trip from Mount Isa. Each driver was armed with a speedo chart, printed in generous type on stout card, which set out mileage of water supplies and advised whether these were good or bad, wood, fuel depots, &c.

The heavy plant which went by boat to Darwin arrived there on 12th September. These items were conveyed on ships specially chartered by the Commonwealth, which also carried the New South Wales contingent. Sufficient operators went with this plant to drive the units from the railhead to the job, where they arrived on the 20th September.

Supplies.

The Army undertook to make available to the men on the job cooked food at about 15s. per week per man, also general medical attention, and to supply fuels and oils for the mechanical equipment. Petrol was available to owner-drivers of trucks at 3s. 6d. per gallon and oil at 4s. 6d. per gallon. This arrangement enabled the civilian staff to concentrate their energies on the actual job of construction and, at the same time, provided excellent training for the Army organisation. However, as there was some doubt as to whether the Army would be able to supply on the job at the date it was proposed the Queensland party should arrive, provision was made for, and supplies taken from Queensland for the first fortnight. The unused surplus was eventually taken over by the Army.

Queensland equipped a store on the job and made available for purchase by the men such items as boots, working clothes, &c.; tyres and tubes for owner-driver trucks were also stocked. Housing equipment in the form of the usual job tents, bunks, &c., was provided by the Main Roads Commission. Owing to the known shortage of suitable timber in parts of the area, supplies of water piping for tent erection were sent from Queensland. Grouping of tents to permit the maximum use of full uncut lengths of piping was planned.

Mechanical Equipment.

The plant sent to the job consisted of the following:—

3 75-h.p. D7 caterpillar angledozers.
2 44-h.p. D6 caterpillar tractors.
4 Tractor-drawn graders.
1 49-h.p. KO Allis Chalmers tractor.
1 35-h.p. TD35 McCormick Deering tractor.
8 35-h.p. RD4 auto patrol caterpillar No. 10 graders.
1 3½-yd. scoop, Le Tourneau, pneumatic tyred.
2 1½-yd. scoops, Gaston, wheeled.
1 drag scoop.
4 ploughs No. 69.
6 rippers.
7 utility trucks.
2 4–5-ton motor trucks, owner/driver.
2 5-ton motor trucks, M.R.C.

together with the usual assortment of smaller plant, tools, and general gear. For the conditions actually encountered on the job, further small tractors and scoops could have been used to advantage. The five large tractors and tractor-drawn graders were sent via Darwin. The remainder went to Mount Isa by rail and by road to the job.

Provision for the repair and maintenance of the mechanical plant was made by sending one of the Commission's travelling workshops to the job.

Briefly, this unit consisted of a 3–4 ton truck chassis fitted with special body containing a lathe, separate 5-h.p. engine, electric generator and motor, electric drill, oxywelding plant, grinder, and an assortment of small tools and stock of material for repair. A separate stationary electric welding plant was also provided.

On arrival at job location, wheels were removed and workshop set up on blocks, table for welding improvised from a sheet of ½-inch plate, several large pieces of bush timber cut and a permanent gallows set up, of sufficient size to accommodate any item of plant on the job.

Various other items such as blacksmith's forge, anvil, &c., were placed in position in such a way as to handle any job in as little time as possible. Most of the work undertaken was repairs to diesel engines and electrical equipment, interspersed with quite a lot of electric and oxywelding of the plant frames, &c.

The mechanical repair staff showed much ingenuity in overcoming breakdowns and getting the plant in service again from the necessarily limited materials available. For example, when bursting high-pressure hydraulic operational hose seemed like depriving the job of the services of a large bulldozer, the lathe was used to wind 12-gauge soft iron wire on to the outside of the available medium-pressure hose and the ends of the wire secured by welding to the end clips, and the plant was soon in work again. This improvised hose gave months of service.

On the road the workshop performed well. During the trip out it kept with the graders all the way. The return trip from Newcastle Waters to Mount Isa was covered in less than three days, which is good time when the weighted vehicle and the care necessary in driving it over bush tracks are taken into consideration.

Spare parts for trucks and mechanical equipment beyond the scope of the travelling workshop were supplied by air mail. The requirements in this direction became a severe tax on the capacity of the weekly air service, particularly for the owner-driver trucks. The upkeep of all machinery was rendered heavy by reason of the sandy soil.

Two portable electric flood-lighting sets were sent to the job for use with night work. These sets were 32-volt petrol engine direct coupled generator type, capable of 800 watt output.

Job Construction Policy.

The new route as selected proved to be some distance from the existing track so that the policy of construction was to make the whole length available to traffic as early as possible,

but to concentrate the main strength on those sections likely to give trouble in wet weather.

To determine these worst sections, visual inspection was assisted by soil tests on the job for linear shrinkage and miniature abrasion loss in accordance with the Commissioner's regular practice. From these investigations, decisions were made as to which sections would be gravelled immediately and which could be left with safety for treatment later by the maintenance gang.

The existing track, like all pioneering routes opened by men whose immediate aim is to get from one place to another with the minimum delay consistent with supplies of water and stock feed en route, followed the most open and flat country. Such a location was not likely to prove suitable for permanent construction.

Prior to the arrival of the Engineering and Survey staff on the job, a certain amount of investigational work had been done by Commonwealth officers. This information was made available and the proposed route then further examined. A survey had been made on the southern half of the road and the line indicated by a fire plough track cut in the red sandy loam, loose sand, and on the quartzite ridges. The line had not been surveyed on the northern half, but some runs in from the existing track to the approximate position of the line showed it to be practically all in heavy lancewood scrub. Considerable deviations were decided upon and pegging put in hand immediately.

The survey work was particularly arduous in the northern half through the lancewood scrub, and the party did well to do 40 miles in about two and a-half weeks. Water and rations for about a week were carried in the utility, which was kept in the vicinity of the survey party. The longest straight was 21 miles. Work continued while daylight lasted and the night camp was made wherever work for the day finished.

The line was set out with theodolite and pegged with 3 inch by 3 inch pegs, 4 pegs per 1,000 feet. At every 1,000 feet the line was offset 50 feet each side for re-establishment purposes. The centre line was levelled and bench marks established at about half-mile intervals: more frequently in special cases, as at Newcastle Creek Causeway site. The minimum curvature was 2,000 feet radius and grades were easy in all cases. During the early stages of the job gravel and rock supply sources were located for future reference.

The Army proposed that the road should be cleared, formed, and provided with a light gravel pavement as quickly as possible in order to make it available for traffic during the greater part of the wet season, which was anticipated to commence during November or December. The Queensland sections were formed 40 feet wide in flat country and 28 feet wide in the ridgy country. In general, provision was made for water to go over the road at long flat invert sections, though in some cases small under drains were provided. Gravel thicknesses on the worst sections were provided in accordance with standard Main Roads Commission practice.

Waterways Design.

Owing to the very scanty information available of the watercourses and watersheds, the estimation of waterways requirements was one of extreme difficulty. The major problem was that of the causeway at Newcastle Creek. The highest flood level data indicated that this crossing was in the vicinity of 5,800 feet long with a maximum depth of about 10 feet of water over the lowest part of the bed. There was no clearly defined channel, but the ground surface of the central section of 1,500 feet averaged about 8 feet below the flood level found. Investigations on the site, from all information available, indicated that about 4,000 square miles drained through this waterway.

During a visit of inspection by the Commissioner and the Deputy Chief Engineer during October, and following consideration of all information available, it was thought that provision should be made for a discharge of 65,000 cu.-secs. It appeared that by providing a causeway 4½ feet below flood level for 5,800 lineal feet there would be no appreciable afflux at high flood stages, and that dangerous velocities would not then occur. To prevent damage by the overfalling water at stages when the downstream side is not drowned, it was decided to provide a substantial downstream wall and secure pavement.

The first flood followed quickly after the initial work, and although damage was done, all Army traffic was maintained. The retaining wall and pavement were then further strengthened.

It is interesting to note, in this connection, that the maximum height of the flow reported over the weir in a recent wet season was 14 inches.

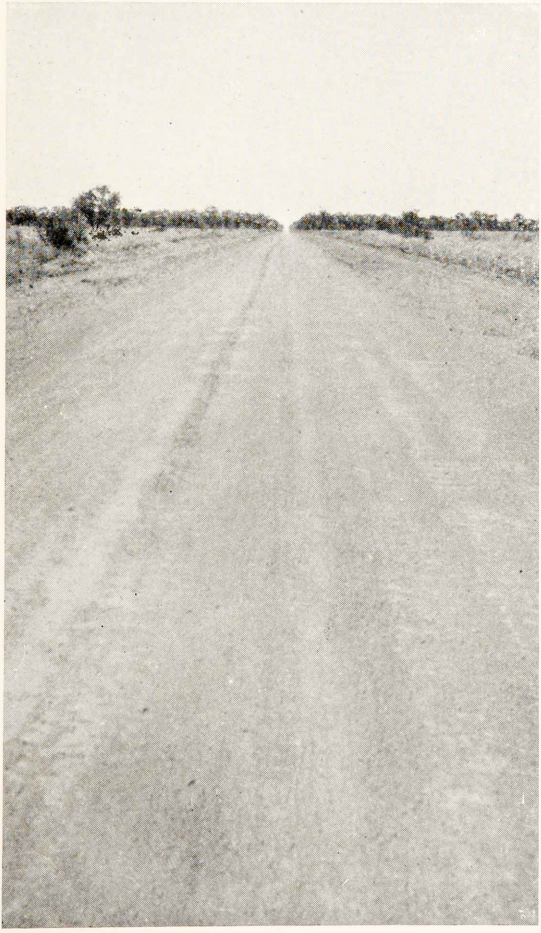
The downstream side was a heavy dry rock wall of local siliceous sandstone with heavy toestones set in the black soil. The deepest parts of the rock face were cement grouted. On the upstream side there was 2 feet of pitching and a thick flank of black clay. The core of the causeway consisted of ironstone gravel from 4 inches downward puddled, as well as circumstances permitted. This was covered with a layer of 5 inch Telford set between ribs of deeper pitching 15 feet apart set across the road. Above the spall course, there was a bitumen penetration course, 3 inches thick, and finally one seal coat of bitumen over the top. An improvised roller was used on the causeway. The surface was canted 1 in 36 against the flow of the stream.

The causeway involved—

Gravel fill, 10,000 cubic yards;
Rock wall, 3,000 cubic yards;
Telford, 9,000 square yards;
Bitumen penetration pavement, 10,666 square yards.

The second main waterway was at Milner's Lagoon. This is a flat swamp some 11,000 feet wide. From information obtained locally, it appeared that the flow could be either to the east or to the west, depending on the location of rainfall. The construction consisted of a formation considered to be at a height to give a clearance of 1 foot above the highest flood

Milner's Lagoon crossing after a wet season.



View across a tongue of Sturt Plain. These views give an idea of the long stretches of straight road.

level as noted from marks on antbeds, debris, &c. Three inverts, each 500 feet in length, were left to equalise the flood waters and at two of these, where sufficient headroom could be obtained, 9 inch pipes were placed. The pavement in this section is 12 inches of exceptionally fine ironstone gravel, well watered and consolidated.

Clearing and Earthwork.

The clearing was done with 3 D7-type caterpillar angledozers. The machines were worked 24 hours a day to provide, as early as possible, ample length for the formation graders. To keep the line at night, hurricane lamps were used—three on each side line, two behind in the cleared space, and one ahead in the timber. The driver kept his line by looking backwards over the lights behind; the offsider moved the rear light forward when the dozer was up to the leading light. This worked very well and the three machines in heavy bullwaddy and lancewood cleared between them up to 3 miles 50 feet wide per 24-hour day.

The formation was done by power graders. In good sandy loam, a mile of formation 40 feet wide with 8 inches crown height was put up in three hours by four machines. However, where the soil was dry and sandy, the progress was very slow. To speed up the graders, a D7 tractor was attached by means of long wire ropes to two graders and provided assistance by towing. All three power units were in action and progress was at the rate of 1 mile in two and a-half hours. No rollers were provided and the only consolidation of the formation was that given by the tyres of the graders and trucks. The metal bed was not boxed out for the gravelling.

Gravelling.

In some cases it was possible to deliver gravel on to the road direct by means of scoops drawn behind large tractors. However, the bulk of the gravel had to be carted over considerable distances and was delivered by motor trucks. Most gravel was loaded by power plant, sometimes a tractor and scoop and sometimes angledozers, in conjunction with a chinaman loader. This device consists of a loading platform with central deck opening built over a trench of sufficient width and depth to accommodate a motor truck below ordinary ground surface. Wheel scoops or angledozers, depending on the length of approach leads, carry the material on to the platform and deposit it in passing through the opening into motor trucks standing below. Some small amount of hand-loading was also done. This was avoided when possible.

Altogether over 98,000 cubic yards of gravel were placed on the Queensland section. A tractor with 1¼ yard scoop delivered to one of these loading platforms a maximum of 600 cubic yards per day with an average of 450 cubic yards per day, and the maximum daily output was just over 3,000 cubic yards, with three dozers and one scoop operating in four pits.

Spreading the gravel was done almost entirely by patrol graders, as the rate of supply to each tiphead was too high for hand labour. The trucks carting the gravel were used to consolidate the road, so that each load had to be spread before the arrival of the succeeding truck. For the sandy sections, tractor assistance had to be provided at times to enable the empty trucks to regain the gravel for the return journey.

To avoid unequal settlement due to dumping, the spread gravel was scarified and re-graded at meal intervals, and after gravelling ceased each day; the gravel was trimmed again later as opportunity offered. The trucks running on the gravel were instructed to break track and roll the whole width of pavement. The well-graded gravel obtained in most pits set down very well without any other treatment.

Costs, Men and Time.

The total cost, including wages, materials, fuel, plant hire, freight, transport to and from the job, floating plant, and small tools, was approximately £64,000 or £593 per mile. The work was costed by the usual system adopted on routine Main Roads Commisison jobs.

Individual unit costs of interest are:—

——	Unit.	Cost.
		s. d.
Clearing	Per 100 lin. ft. ..	10 0
Formation	Per 100 lin. ft. ..	9 11
Rockfill	Per cubic yard ..	9 9
Gravel	Per cubic yard ..	4 2½

These figures do not include certain Army transport costs. The number of men on the job fluctuated slightly, but the average was 170. Usually work was confined to one shift with overtime as conditions warranted. In special cases work such as clearing with bulldozer and grading was carried over three shifts.

The first stage of the work was completed on the 6th December, and the main Queensland organisation left for home without delay, to avoid being weather-bound in the Northern Territory until after the wet season. As the northern track via Anthony Lagoon, used on the outward journey, had already received some falls of rain, the return road journey to Queensland was made by the southern route via Banka Banka and Rockhampton Downs to Mount Isa.

The total construction period from the date of the arrival of the first convoy on 10th September, 1940, was 12½ weeks, or 88 days in all. The average progress was thus 8⅘ miles per week. The clerical staff had an additional duty in the operation of a Commonwealth Savings Bank Branch which was opened for the benefit of the men. Judging by the volume of business, this was much appreciated.

Maintenance.

It was arranged by the Commonwealth that a small maintenance organisation should be left on the job until 30th June, 1941. Consequently, a foreman with about a dozen men, two power graders, tractor, scoop, and small gear were left to maintain the road and progressively improve the sections not previously gravelled.

Much of the material used in the original construction contained oversize quartzite, and

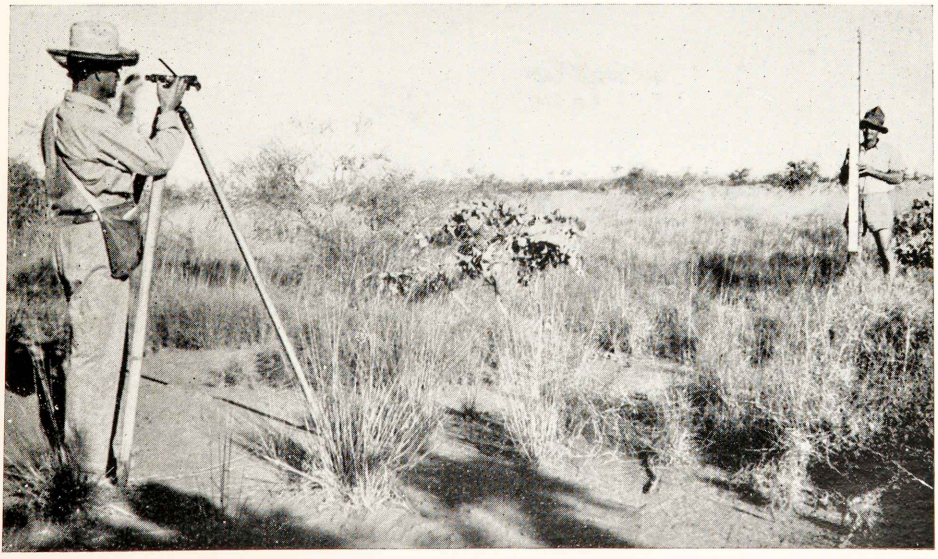
in dry weather this became loose. Nevertheless it served its purpose well in the pioneer work of providing access in wet weather at a very critical period in Australian defence work.

The whole road from Alice Springs to Port Darwin via Tennant's Creek and Larrimah (including the above section constructed by the Commission) was subsequently improved to very high standard under requisitions lodged with the Allied Works Council.

Upon the completion of the section constructed by the Commission, it was essential that the men and plant should proceed to the base at Mount Isa before the wet season. Army authorities had practically guaranteed convoy assistance, but apparently found some difficulty in providing it. The Quartermaster-General, Australian Army, had sent to the Commissioner a letter of thanks for Queensland's part in the undertaking just completed, to which he added a personal note of appreciation "as one Queenslander to another." As the convoy still failed to materialise, Mr. Kemp sent an urgent wire to the Quartermaster-General "as one Queenslander to another," and shortly after, somehow or other, Army assistance was freely rendered.

The Army's regular maintenance of supplies and ready aid in all matters did in fact do much to assist in the progress of the work. It is also wished to express appreciation of the prompt help and co-operation received from many officers of other Departments, both in this and other States. On the whole, the men worked well, the plant operators particularly so; staff officers did well, frequently under conditions which were very trying. Acknowledgement is here made of all loyal and faithful service rendered which, coupled with careful organisation and supervision, was responsible for the successful completion of the project.

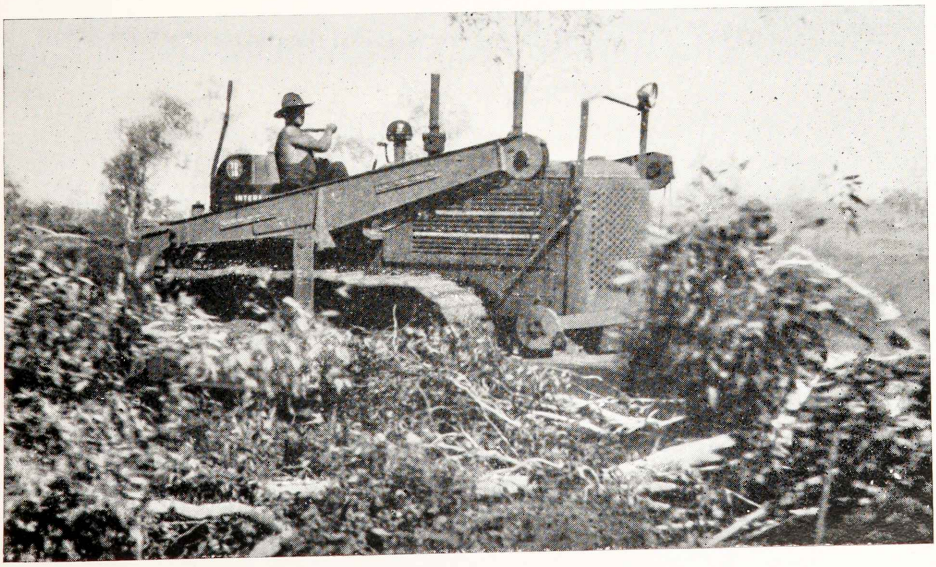
Mr. J. R. Kemp, Deputy Direc'or General of Allied Works, (right) with the late Mr. W. J. Young, Liaison Engineer for Queensland, and Mr. W. H. Wearne, Surveyor, on the Mt. Isa-Tennant Creek Road.



Surveyor at work near Camooweal. The photograph shows the type of vegetation in this area.

INLAND DEFENCE ROADS.
MOUNT ISA-TENNANT CREEK.

First cut with grader on Camooweal Section.



Bulldozer blazing trail.

INLAND DEFENCE ROADS.
MOUNT ISA-TENNANT CREEK.

Thirty miles west of Camooweal, after one inch of rain.

North end of Causeway.

First seal coat being placed.

CHAPTER 3.

INLAND DEFENCE ROADS—continued.

MOUNT ISA-TENNANT CREEK.

A military road link between Mount Isa railhead in Queensland and the North-South road running from Alice Springs to Birdum through the Northern Territory was first proposed by the Commissioner to Mr. Forgan Smith, then Premier, during October, 1940, at the time the latter road was first being constructed. At this time the link was proposed to be across the black-soil plains of the Barkly Tableland from Camooweal through Avon Downs, Brunette Downs, and Anthony's Lagoon to join the North-South road at Newcastle Waters, and a tentative estimate of £20,000 was suggested as the cost of lightly grading the black soil to a road formation on 17th October, 1940. It was thought that the plant returning to Queensland from the North-South road could have performed this grading work. Mr. Forgan Smith agreed, but his offer to have the work done was not accepted and the project was shelved until 15th March, 1941, when the Department of the Army advised that approval had been given for the construction of the most direct link from Camooweal to Avon Downs, Alroy, and to Phillip's Creek, at an estimated cost of £30,000, the Main Roads Commission to supply all plant and engineering services, whilst Army would supply fuel, food, cooks and cooking utensils, medical services as well as telephone and radio facilities.

As a result of this approval, in April, 1941, an engineer with two surveyors were sent out to locate and peg the best route between Camooweal and Tennant Creek, avoiding as far as possible the black-soil plains and swampy areas. The engineer in charge of a road gang then working between Mount Isa and Camooweal was instructed to shift his organisation over to carry out the work in as short a time as possible. The route was examined from the air, and then by motor vehicle, making a compass traverse and pegging the first 83 miles to the Rankine River, where the country changed from the open rolling downs to sandy gravel ridges, with no surface water for 200 miles. While the construction party started on the initial 83 miles, the surveyors traversed and investigated the 200 miles stretch, then returned in time to start pegging the final line ahead of construction. Owing to the danger to travellers of having so long a stretch without water, authority was asked on 10th June, 1941, to sink four bores at suitable sites, and this was agreed upon on 30th June, 1941. At this time also, extra funds to allow for gravelling of black-soil areas and watercourses was also asked.

The original clearing and forming job, 283 miles in length, was commenced on 7th April, 1941, and completed on 24th July, 1941. The work of gravelling bad sections was then commenced and carried on throughout 1941 with a comparatively small gang. At the same time, the section between Mount Isa-Camooweal and the Queensland-Northern Territory border was being improved by the Main Roads Commisison as a normal State project.

On 7th January, 1942, owing to the strategic position in the Pacific area, the necessity of having the whole road completed to all-weather standard became urgent, and an immediate requisition of £60,000 was placed to enable the worst places in the Northern Territory section to be strengthened.

On 29th January, 1942, War Cabinet approved of the construction of the whole Mount Isa-Tennant Creek road as an all-weather road, together with the provision of bores for water supply. As a result of this decision, fresh estimates were prepared on the basis of metalling the whole length, and the creation of an organisation of sufficient size was undertaken. This resulted in an engineer being sent out in March, 1942, to take charge of the whole project, with an additional 320 men and plant, another assistant civil engineer, and a mechanical engineer.

The initial bores put down about 120 miles west from Camooweal were not successful, but by May, 1942, good supplies had been struck at 132 miles and 242 miles. Dr. F. W. Whitehouse, of the Queensland University Geological Staff, then in the Army, was seconded to the Main Roads Commission, and having visited the area as adviser and carried out an extensive reconnaissance he made what proved to be a very accurate forecast of the water possibilities. The number of boring plants was then increased to four and a programme of bores at about 10 mile intervals through the "desert" section was carried out.

The work of gravelling the road 20 feet wide and to sufficient depth to carry the heavy traffic was pushed ahead as fast as possible. The work was on a continuous basis, except for Sunday. The natural difficulties of a dry, sandy country, with poor water supplies and heavy wear on machinery, were greatly aggravated by the almost continuous military traffic, which for some months during 1942 approximated 1,000 heavy trucks per day apart from light vehicles. Supplies of all kinds were difficult to obtain and there were no facilities for recreation for the men, who lived in depressing conditions. There was a bad plague of bush rats during the winter of 1942, and hordes of flies were always present.

By August, 1942, the gravelling of the road was completed to a stage that enabled traffic to get through comfortably, but was not yet full width or depth. In addition, concrete and steel bridges had been completed over two

main streams, and steel girders with timber tops over two others. About this time, because of the impossibility of maintaining the gravel surface under the concentrated traffic, bitumen surfacing 16 feet wide was also discussed and preparations made for obtaining the necessary plant and materials. Also during August the first enrolment of men on the job into the Civil Constructional Corps was made.

By the end of 1942 the whole road was gravelled 20 feet wide, although from then on there was continuous resheeting with gravel on account of the extreme loss through traffic, which worked out at approximately 1 inch depth per month.

The first bitumen surfacing was done in January, 1943, a plant having been established in Mount Isa for the manufacture of bitumen emulsion. Screenings were obtained from ridge gravels, and by the middle of 1943, when adequate plant arrived for obtaining the screenings, work was accelerated.

In March, 1943, the Allied Works Council decided to withdraw 400 of the Civil Constructional Corps men from the job and replace them with 540 members of the Civil Alien Corps. This transfer took place during May, June, and July and caused considerable dislocation as the aliens had to be taught to use plant. A further emulsion plant was erected at Camooweal and later in the year the Mount Isa plant was dismantled and transferred to the North-South road in the Northern Territory.

Bitumen surfacing was completed and the organisation dismantled in May, 1944, the road then being handed over to the Department of the Interior, which undertook the maintenance of the project. The job workshop, however, was continued until January, 1945, to service works on the Camooweal Aerodrome and to rebuild all plant before transfer. The following statistics are of interest in connection with this project:—

Length, 402.5 miles, with turnouts, 405 miles.

Width of gravel, 20 feet.

Width of bitumen, 16 feet.

Gravel spread, 1,505,092 cubic yards.

Bitumen screenings used, 142,500 cubic yards.

Bridges constructed, 9. Total length, 859 feet.

Bores sunk, 26 (2 duds, 3 abandoned, 21 successful).

Maximum number of men employed, 785.

Final cost, £1,616,500.

IPSWICH-CHARTERS TOWERS.

The Inland Defence road extends from Ipswich, on the Southern Railway, to Charters Towers, on the Northern Railway, a distance of approximately 882 miles, and the route followed passes through Nanango, Goomeri, Gayndah, Eidsvold, Banana, Wowan, Duaringa, Emerald and Clermont.

For purposes of wartime construction, the Queensland Main Roads Commission was allocated the section from Ipswich to Duaringa (476 miles), and the Department of Main Roads of New South Wales was allocated the section from Duaringa to Charters Towers (406 miles).

This statement deals only with the section allocated to the Queensland Main Roads Commission, but some general comparison with the other section may be of interest. On the Queensland section an appreciable amount of construction had been carried out prior to the war and the length to be built was less; but to offset this there were many more bridges to be built and the nature of the country called for much more heavy earth and rock cutting than on the New South Wales section.

Although work was under way on a number of sections earlier in 1942, it was not until August of that year that operations were intensified, and every effort was made to have the road trafficable by the end of that year.

Resident engineers were stationed on various sections of the road, as follows:—Between Eidsvold and Camboon; between Camboon and Rannes, and between Rannes and Duaringa. The Commissioner's District Engineer at Rockhampton was made Co-ordinating Engineer for the whole of the Queensland section. The work was spread over three engineering districts and was supervised therefore in part from Head Office and in part from Rockhampton Office, the distribution of the work being—

——	Road. Miles.	No. of. Bridges.
Supervised from Head Office ..	69·40	30
Supervised from Rockhampton Office	135·63	39
Totals	205·03	69

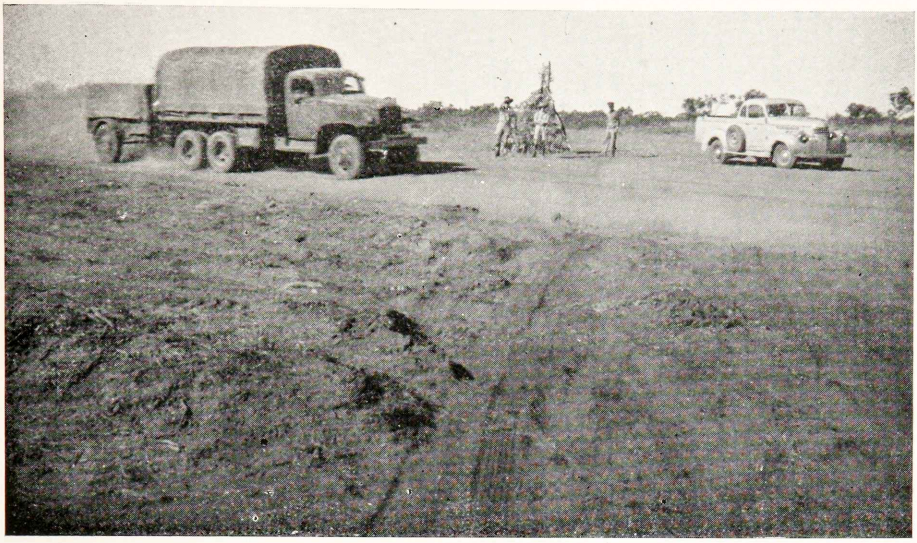
Paving Features.

The Army requisitions called for a gravelled pavement 12 feet wide, of a standard to permit "all weather" traffic, with a formation generally 28 feet wide. Alignment and grades were to be subservient to speed of construction. Higher types of surfacing were used only at causeways and inverts.

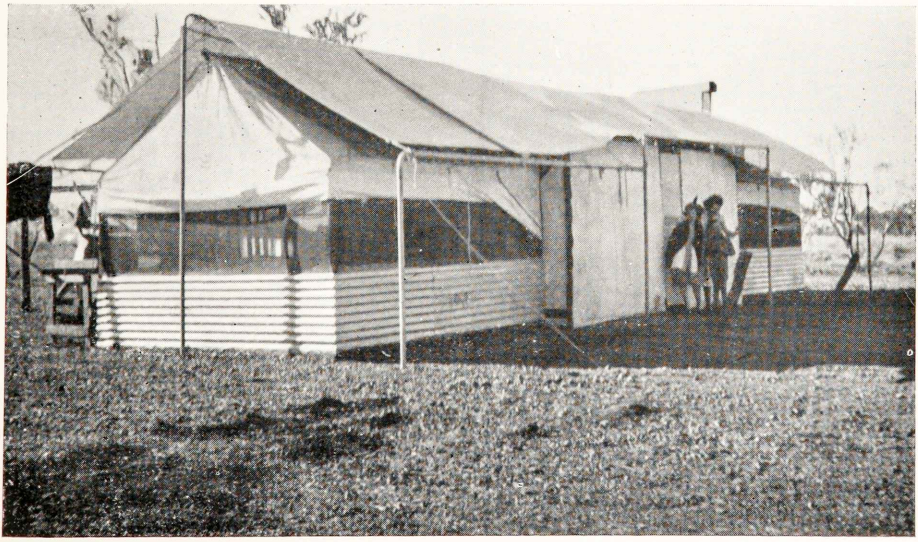
The road work carried out included a small amount of reconditioning of existing works, but the bulk of it was entirely new construction. Paving materials used were approximately 361,000 cubic yards. Earthworks (including rock excavation) were particularly heavy and/or extensive on certain sections. As an illustration, over nine sections aggregating some 75 miles in length, nearly 400,000 cubic yards of earth and rock works were undertaken.

In places, in order to save time and effort, grades were redesigned on the ground to reduce earthworks and, in one case near Mount Sebastopol, in the Westwood district, a deviation about 2¾ miles long was constructed through a cattle property, thereby shortening the road by about 2½ miles. The possibility of a major deviation to link up Rannes direct with the Gainsford crossing of the Dawson River was examined on the ground, but it was thought preferable to take advantage of the large amount of existing road work on the route through Wowan and Gogango.

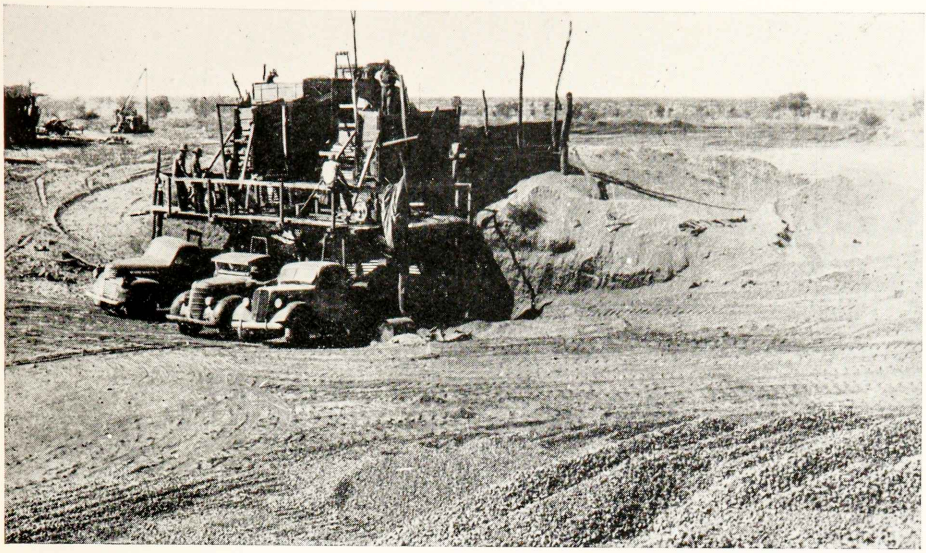
INLAND DEFENCE ROADS.
MOUNT ISA-TENNANT CREEK.



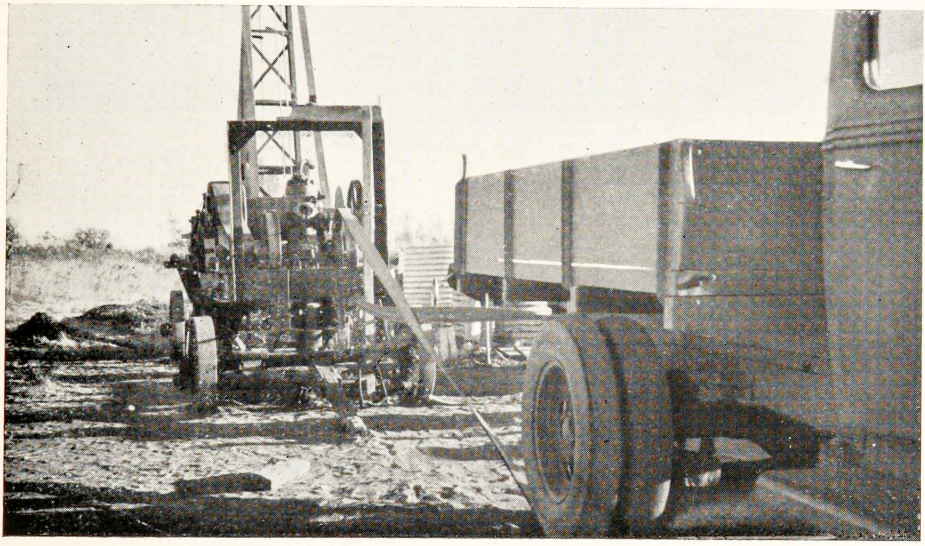
The junction of the Mt. Isa-Tennant Creek Road and the North-South Road.



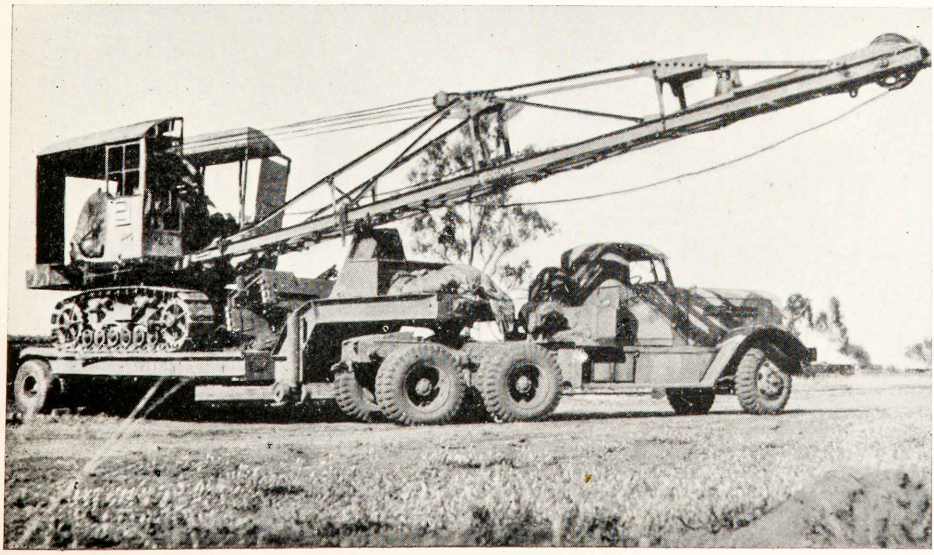
Home of the late Mr. T. Middleton, Engineer in Charge, Mt. Isa-Camooweal Section.



Gravel screening plant at 261 miles, Mt. Isa-Tennant Creek Road.



Truck used to provide motive power for boring plant.



Low level float transporting dragline excavator.

Men and Plant.

The work was helped very considerably by the transfer of men and plant who were working with five contractors on other roads. Satisfactory arrangements were made for the termination of the contracts in each case.

The gang brought over by one contractor was used in the first instance on the Don River crossing at Rannes, a most important structure comprising 330 feet of bridging in three separate structures, with rock fill causeway. Two contractors working on the Inland Defence road were unable to carry on satisfactorily; their contracts were determined by mutual consent, and they were employed under day labour on the sections for which they had held contracts.

Men and plant were made available also by transfer from Public Estate Improvement works in the Baralaba-Moura area in November, 1942. In addition, a Main Roads gang, complete with plant and all equipment, was made available from the Charleville district, and was put to work between the Gogango Range and the Dawson River.

Non-refugee enemy aliens, to the number of 120, were employed on a heavy rock section at Camboon. In the earlier stages they were under military guard, but after a short period the guard was taken away. Incidentally, at a spot in a cutting on the aliens' section, a strong smell of petrol was noticeable for some time, causing much speculative thought. The reason for the smell was never discovered.

Several complete bridge gangs were made available, with plant, from jobs in Northern and in Southern Queensland and helped the bridge position considerably. The number of bridges to be built called for a big concentration of suitable men, and some were actually brought over to the job from Western Australia. Carpenters from other branches of the trade were tried on bridge work, but were not, in general, very satisfactory. The number of men employed on the road was, at the peak in November, 1,340, including all classes of labour. The peak number of bridge men was 155.

Rationing.

Until the Civil Constructional Corps got into swing, the men employed were mostly those who were used to road and bridge work, accustomed to bush life and preparing their own food. With the C.C.C., however, men unaccustomed to bush life were brought in, and it became necessary to establish cookhouses and dining facilities and purchase and cook all food. This was a major innovation, and for a start caused very much worry to officers in charge of jobs, who had in many cases to persuade unwilling cooks to carry on with limited and unsatisfactory equipment.

Fortunately, arrangements were made for the Army to supply the bulk of the necessary rations. Later, when the difficulties had been surmounted and provisioning was on a satisfactory basis, victualling was taken over by officers of the Allied Works Council.

Normal working hours were the exception rather than the rule, and plant operators and bridge men in particular worked much overtime in an effort to make satisfactory progress. Double shift work was carried out to a very limited extent.

Road construction plant was generally insufficient in quantity and items were of moderate capacity only. The plant position on one section of about 40 miles was such that nearly all the paving material used thereon had to be hand loaded. Plant becoming available elsewhere was delayed frequently by inability of the railways to handle at times anything but freight of the highest priority.

A number of pneumatic-tyred tractors was used and found helpful, not only for ploughing and pulling small scoops, but also for snigging timber, hoisting timber, and general work in bridge construction. A travelling workshop operated on sections of the road north of Eidsvold and did much good work in keeping plant at work.

A large number of horses was available, but could not be utilised to the fullest extent as there were insufficient men to work them. They proved most effective on the section manned by aliens, where this disability was not present to the same extent.

With reference to bridge work, attention is drawn again to the fact that 69 structures had to be completed. These involved 5,238 lineal feet, total length, 182 spans, 138 abutments, 113 piers.

Timber Supplies.

Obtaining timber was a big problem and various means of surmounting it were adopted. A sawmill on the Eidsvold-Cracow road was taken over on a rental basis, rearranged for more economical working, and was run as far as possible on a double-shift plan. Logs were obtained by day labour and carted to privately owned sawmills at Cracow and Biloela for milling. Day-labour gangs cut and hauled piles and girders in the Banana district.

The Acting Bridge Engineer and his staff in Head Office were able to arrange for the supply of large amounts of timber, especially girders and corbels, not only for the Queensland section, but also, to some extent, for the New South Wales section. The Timber Controller rendered most valuable help in placing orders for timber, in following up deliveries, and advising as to likely sources of supply.

With the building of a higher level bridge over the Barcoo River on the Charleville-Blackall Defence road, the old structure previously built by this Department was dismantled. Suitable timbers from it were railed from Blackall and used in several bridges between Rannes and Duaringa.

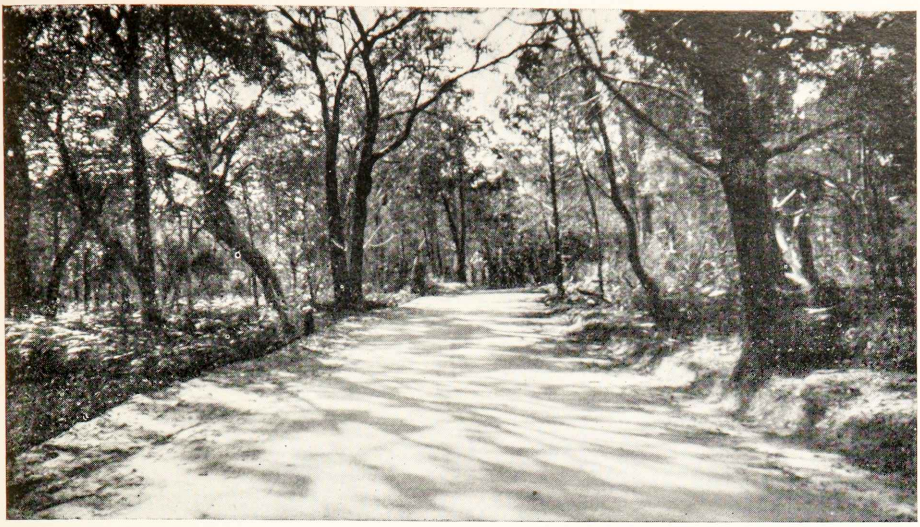
Bridges Built.

Although the Army requisition called only for bridges with a "durability of three to four years," it was possible almost without exception to make use of first class timbers, thereby building into the structures, with but little added cost, many years of useful and economical life. Main Roads Commission standard practice is to provide reinforced concrete kerbs on timber bridges, but the Commissioner decided that, to save delay, round timber kerbs could be used. This was done in one case only.

Included in the bridges were two railway overbridges and a structure which, beside crossing Blackbutt Creek, crossed a railway line also. Of the 69 structures, 12 were built by contract and the balance by day labour. In many cases the contractors were assisted to obtain timber, and a good spirit of co-operation was maintained.

Two bridges on the Queensland section, at Bone and Sharpers Creeks, were built by the New South Wales forces, who were conveniently placed to carry out the construction from their nearby sectional office at Duaringa. The work carried out by the aliens on five bridges at Camboon was remarkable for the fine workmanship shown in masonry piers and abutments. Expenditure on the Inland Defence road between Ipswich and Duaringa amounted to:—

	£	s.	d.
Commonwealth funds	402,413	1	4
State funds	369,709	10	8
Total	£772,122	12	0



Defence Road on the mainland side of Pumice Stone Passage, Bribie Island, showing the preservation of natural camouflage.

Site of the first grave of the explorer Landsborough with cairn and enclosure erected by M.R.C.

Driller at work between Wallangarra and Stanthorpe.

CHAPTER 4.

STRATEGIC ROADS AND SERVICE ROADS AND BRIDGES.

The Main Roads Commission carried out surveys and prepared plans for all road and bridge work connected with Defence, the total number of jobs, including some maintenance, running to approximately 700, situated in all parts of Queensland and apart from the Inland Defence roads already dealt with. The strengthening and in some cases the reconstruction of existing bridges was an important feature of this work, also the general improvement of many miles of existing roads to meet all possible military requirements.

After an early survey of Army requirements work was allotted to the Main Roads Commission on roads and bridges between the following points with a first estimate of the probable cost in each case:—

	£
Ipswich-Emerald	28,200
Eidsvold-Banana-Rannes	19,300
Rannes-Westwood-Duaringa	128,600
Duaringa-Charters Towers	930,000
Charters Towers-Townsville	271,000
Toowoomba-Landsborough	136,000
Maryborough-Goomeri-Gympie ..	98,300
Maryborough-Gayndah	109,000
Bundaberg-Gayndah	7,000
Gladstone-Banana	105,000
Rockhampton-Rannes	76,300
Rockhampton-Westwood	50,000
Hughenden-Charters Towers	400,000
Mackay-Clermont	201,000
Cairns-Kuranda-Atherton	42,600
Boggabilla-Goondiwindi	5,000
Goondiwindi-Stanthorpe	121,000
Stanthorpe-Wallangarra	23,900
Mungindi-Thallon	28,000
Bourke-Cunnamulla	168,000

A further series listed for attention included the roads and bridges between Harlin and Kilcoy, Cedarton and Maleny, Villeneuve, Neurum and Cherulla, Maleny, Kenilworth and Gympie, Woodford and Glasshouse Mountains, Kenilworth, Mapleton and Nambour. Also the provision of a route negotiable by military transport between Mungana and Cape York, Laura and Cooktown, Coen and Port Stewart, Archer River-Wenlock and Iron Range.

Pursuant to the general policy of bringing all work to the standard of military requirements, roads and bridges were strengthened or rebuilt on the following connections:—

Toowoomba-Brisbane.
Tenterfield-Brisbane via Mount Lindesay and Beaudesert
Tenterfield-Brisbane via Stanthorpe and Pilton
Grafton-Brisbane via Coolangatta
Brisbane-Gympie via Landsborough
Brisbane-Ipswich
Ipswich-Eidsvold
Eidsvold-Duaringa
Charters Towers-Townsville
Iveragh-Rockhampton
Maryborough-Gayndah
Maryborough-Gladstone.

Roads were built to serve American Army camps and installations in many districts and in addition to these undertakings mention may be made of the following service roads and bridges:—

Pumice Stone Passage.

A gravel road, 12 feet in width and approximately 2¼ miles in length, extending from Caloundra southward on the mainland side of Pumice Stone Passage, was built in 1941. This job involved the construction of a bridge consisting of two 30-foot spans over Lamerough Creek, near its mouth, to a jetty 100 feet long at the end of the road. The estimated cost was £4,833. The route followed existing tracks as far as possible and it was well camouflaged by the preservation of natural timbers. This was known as the Golden Beach road.

From the jetty at the southern end road-making material was carried by punt to Fort Bribie Island and from the landing stage there another gravelled road was built for a distance of 2 miles to the vicinity of the lighthouse. The roads on both sides of Pumice Stone Passage were an integral part of the Defence installations on Bribie Island described elsewhere.

Historic Cairn.—During the construction of the mainland road the engineers came upon a small plot of ground north of Lamerough Creek where the body of William Landsborough the explorer was first laid to rest after his death at Caloundra on 16th March, 1886, at the age of 62 years. The remains were removed and reinterred at Toowong Cemetery on 13th June, 1913. Recognising the historic interest attached to the site of the first grave the Main Roads Commission erected thereon a memorial cairn with a brief inscription and a substantial enclosure. Born at Ayrshire, Scotland, William Landsborough did a good deal of exploratory work entirely unassisted. In 1858 he traversed the Comet River to its head and in the following year he reached the head waters of the Thomson. On the recommendation of Mr. (afterwards Sir Augustus) Gregory he led an expedition which sought to learn the fate of the explorers Burke and Wills. On that journey he discovered and named the Gregory River and another which he named the Herbert, subsequently changed to the Georgina. He was given a grant of land at Caloundra and held the office of inspector of Brands for East Moreton at the time of his death.

Stanthorpe-Wallangarra.

The Wyberba Section of the Stanthorpe-Wallangarra road was the final section required to provide a constructed highway from the Border to Brisbane. Work was carried out at the request of the Army to overcome the

bottle-neck on the old road at this section. which was a narrow track winding among huge granite boulders. Construction consisted in the main of heavy rock work to provide a suitable grade and the provision of necessary drainage and bitumen-surfaced pavement.

The job proved difficult because of the extremely hard nature of the rock and the proximity of the main southern railway line carrying heavy war traffic. At one spur the new road overlooked the railway and inter-state telephone line. Here a rock wall 350 feet long was built to support the fill from the sidelong cutting and during operations a fettler was constantly employed supervising the removal of fallen rock from the railway line. To safeguard certain important Army and broadcast lines, some telephone wires were placed underground on this spur. A Post Master General linesman was on duty to repair wires broken by flying stone during blasting operation.

Access tracks had to be made to get the six compressors used on the job into place. So hard was the rock encountered that drills would only cut about 3 inches before they had to be changed, and men were constantly employed carrying tools from the work to the drill shop. Approximately 7,000 lineal feet of drill steel were used on rock drilling. The placing of pipe culverts was made difficult by the need to excavate in solid rock to prepare an even bed, and the construction of a dogproof fence along the western boundary of the road was carried out over rugged rock-strewn country. The completed job cost £63,500, occupied 18 months, and employed a maximum of 60 men.

Cecil Plains.

To provide access to the aerodrome at Cecil Plains the road from Dalby was widened and regravelled to a width of 16 feet for 7¼ miles and 12 feet for 9¼ miles. Realignment work was carried out, new gravel sections provided, an old timber bridge over Oakey Creek repaired, and approaches to Ashall Creek bridge repaired after flood damage. The value of this job approximated £34,247 with a maximum of 63 men employed.

Thallon-Mungindi.

A road from Thallon to Mungundi was constructed as part of the strategic roads programme, but owing to changing war conditions it was altered considerably. The work comprised grading stone pitching, trimming, laying reinforced concrete pipes, constructing box culverts, and gravelling. Heavy flooding caused delays and isolated the camp for several days.

Charleville-Tambo-Blackall.

The construction and gravelling of a strategic road 20 feet wide for 112 miles between Charleville and Tambo involved some land resumptions and resumption surveys, whilst grids, waterways, and concrete inverts had to be provided. Soft limestone was the only material available over a considerable length of this road and it was necessary to strengthen this by the addition of river gravel. Steel rail grids 20 feet wide were electrically welded in. Use was made of the existing road where possible, but much realignment was necessary. Some interruption took place when men and plant were moved to the Cloncurry-Tennant Creek road and a new organisation had to be built up. The job was completed in 14 months, nevertheless. Approximate value of the work was £372,401 and the maximum number of men employed 325.

Gayndah Bridge.

A record flood occurred in the Burnett River in February, 1942, and the traffic bridge at Gayndah, on the Inland Defence road, was washed away. The position was regarded as serious, if not critical, and it was immediately decided to replace the bridge with a new structure 630 feet long at a higher level. Unfortunately the railway bridge had also been damaged and it became necessary to offload material some 15 miles away and use road transport. A later fresh in the river and the fact that all materials had to be produced from the raw state caused delay. To assist in the work the complete organisation of three bridge contractors was taken over and by dint of special effort traffic was able to use the new bridge 13 weeks after commencement.

This structure required over 10,000 lineal feet of piles, girders, and corbels, nearly 108 super. feet of sawn timber, and over 54,000 lb. of ironwork, bolts, nuts, &c., and considerable difficulty was experienced in obtaining these materials, private supplies being handicapped by shortage of manpower and plant. As it became evident that the sawn timber required for bridges and drainage schemes could not be obtained through the usual channels it was decided to take over a bush sawmill and operate it as a job undertaking. A total of 370,000 super. feet of sawn timber was produced by this means besides the logs required. A considerable quantity of the sawn timber was supplied to jobs in the Central District, thus helping to relieve the overloaded railways. Total expenditure on this undertaking was £15,700 approximately.

Banana-Gladstone.

Various sections totalling 35 miles of gravelled road 12 feet wide, with fifteen bridges totalling 1,488 feet, were constructed on the Banana-Gladstone strategical road, which employed a maximum of 280 men and cost approximately £315,000.

Eidsvold-Duaringa.

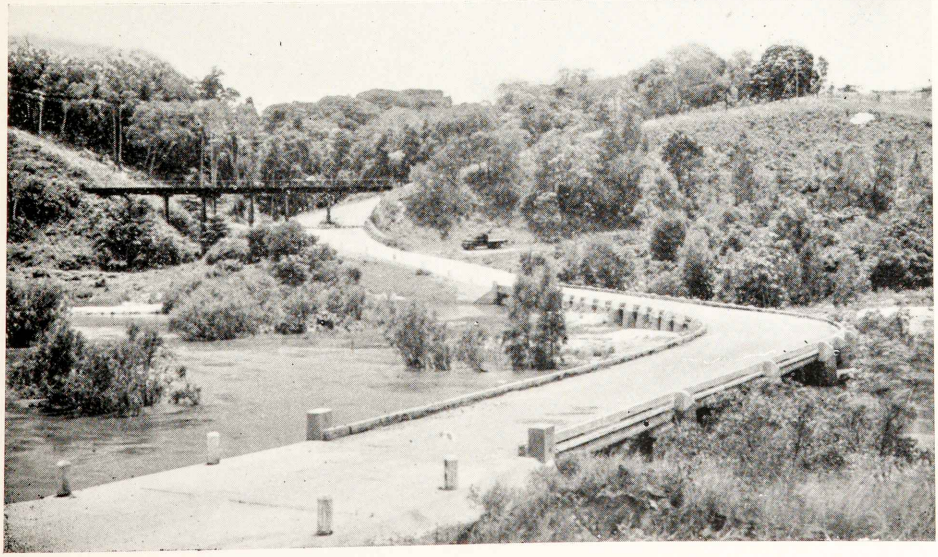
The Central district portion of the Inland Highway extended from Eidsvold to Duaringa and comprised 151 miles of road construction with 44 bridges totalling 3,222 feet in length. Begun in February, 1942, with Main Roads Commission plant and men it was completed in March, 1943, with Allied Works Council equipment and personnel. Approximate cost £424,000.

Clermont-Mackay.

Earthworks, metalling, drainage, and bridge construction were the features of work on the Clermont-Mackay road, which employed a maximum of 357 men, including some aliens. Approximate cost £60,000.

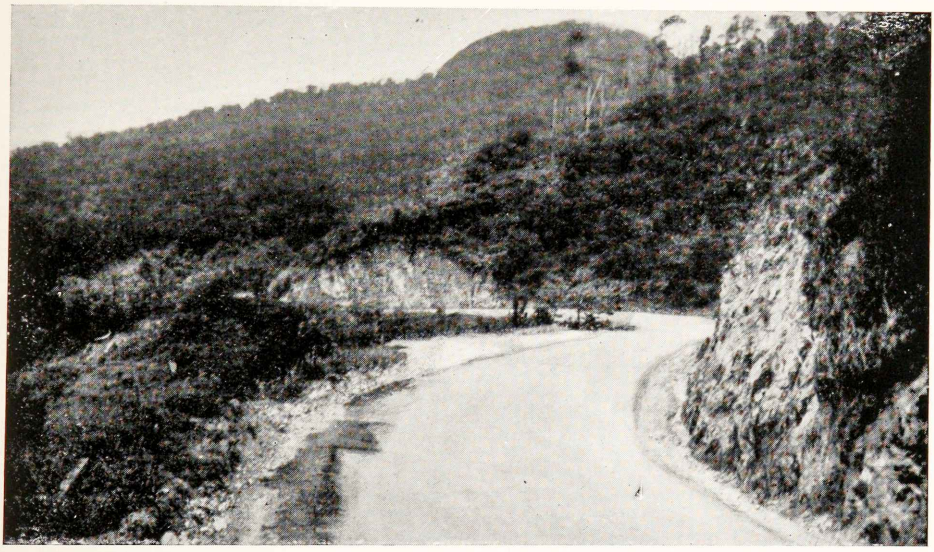
Prydes Pinch, the scene of heavy excavation work on the Hampton-Esk Section of the Toowoomba-Caloundra strategic road.

Bridge built over Georgina River, North-Western Queensland.



Woothakata Shire, Kuranda Highway (Cairns-Kuranda Road). Widened low-level bridge over Barron River, and approaches. The upstream side of the bridge was constructed by P.E.I. Branch some years ago.

View of the Cairns-Kuranda Road.



Cairns-Kuranda Road showing Point Lookout.

Cairns-Kuranda Road looking back towards Streets Creek.

Rockhampton-Emu Park.

New bridges were built over Spring Creek and Canton Creek on the Rockhampton-Emu Park road and roads made in the Pandoin U.S. Army Camp area.

Lakes Creek-Nankin Junction.

The Lakes Creek-Nankin Junction road was graded and made trafficable and the Nankin Creek Bridge repaired.

Parkhurst-The Caves.

On the Parkhurst-The Caves section of the Rockhampton-Mackay road the work consisted of clearing, grubbing, earthworks, drainage, gravelling to a width of 20 feet, the construction of a bridge over Ramsay Creek and the strengthening of several old bridges. Maximum of 160 men employed included 50 aliens. Approximate cost £32,000.

Townsville-Charters Towers.

Wartime traffic became so heavy at times, particularly between Townsville and Charters Towers, that the railways could not possibly cope with it and speedy provision for heavy road transport became imperative. Work on the Townsville-Charters Towers road, length 83 miles, was accordingly arranged in nine sections. On the first 8 miles, Townsville to Stuart, the existing formation was 20 feet wide with a bitumen surface of 12-18 feet width; from Stuart to Brookhill (8-12 miles), formation 20 feet, gravelled 12 feet; Brookhill-Woodstock (12-26 miles), gravelled 12 feet with top-dressed flanks each 4 feet wide and formation 20 feet; Woodstock to Reid River (26-36 miles), gravelled to 12 feet, formation 20 feet; Reid River to Haughton Valley (36-46 miles), earth formation 26 feet; Haughton Valley to Mingela (46-49 miles), bitumen penetration 9 feet wide, formation 15 feet wide; Mingela to Macrossan (49-65 miles), earth formation 20 feet wide; (65 to 65½ miles), concrete pavement 18 feet wide; Macrossan to Charters Towers (65½-79 miles), earth formation 26 feet wide; (79-81 miles), gravel 12 feet wide and formation 20 feet; (81-83 miles), bitumen surface 16 feet wide.

The work carried out by the Main Roads Commission consisted of 28 feet formation with bitumen-surfaced gravel to a width of 20 feet between Stuart and Reid River and from the Burdekin River at Sellheim to Charters Towers with passing places sufficiently large to allow of convoys up to 500 vehicles passing each other. Also widening the Haughton Valley-Mingela section to permit the passing of two-way traffic. Traffic on this road reached such proportions that it was only with the greatest difficulty that the gravel surfaces could be maintained. The provision of 32 bridges aggregating 3,000 feet in length and a considerable amount of cross drainage was included in the work. Approximate expenditure, £420,000.

Tableland Roads.

When Atherton and Evelyn tablelands became the headquarters for a number of Australian Army Corps and the centre for military hospitals, army stores, &c., much road construction work was rendered necessary. From Cairns a road was built through Kuranda, thus providing an alternative route from the coast. Other tableland projects included strengthening and/or bitumen surfacing the following roads:—Tolga-Kairi-Danbulla; Atherton-Rocky Creek; Gillies Highway, Longlands Gap; Longlands Gap-Wondecla and Longlands Gap-Chilverton; Ravenshoe-Mount Garnet; Atherton-Yungaburra; Kulara-Kairi; Kulara-Barrine-Gillies Highway. There was 65 miles of road included in this project, mainly widening from 12 to 16 feet and 18 feet, resheeting and bitumen surfacing. The bitumen was applied at the rate of 1½ miles each working day under difficult conditions.

The work was started in the wet season when rain falls at a rate of up to 180 inches per annum and with 80,000 troops in the area. To lay a strip of bitumen and cover it with screenings occupied 20 minutes, and at times this would hold up over 100 vehicles at each end of the strip. Sidetracking was out of the question as much of these roads ran through tropic jungle and it would have taken longer to make suitable sidetracks than to treat the road itself. Maximum of men employed 120.

Work on the Rocky Creek-Mareeba and Mareeba-Kuranda roads, length 39 miles, was similar in character. There were 3,100 cubic yards of road mix delivered and 36,500 square yards spread and sprayed in nine working days. At the peak 110 men were employed.

In 1944 it became necessary to recondition the Cairns-Atherton-Mareeba road connections. This included widening, metalling, and bitumen surfacing much of the road, also widening the Barron River bridges and approaches at Kuranda and Mareeba. Approximate cost £179,975.

A "Backbone" Road.

In 1942, the only means of conveying material and personnel to advanced operational bases on Cape York Peninsula was by sea to Portland Road and thence by primitive roads that were impassable during the wet season. The construction of an all-weather road from Mungana northward to Jacky River was accordingly suggested. Several routes were considered, including that of the bush tracks via Wrotham Park, the Mitchell and Palmer Rivers to Laura, and thence to Coen and Wenlock (the old Batavia River goldfields). It was realised, however, that whatever route was followed the job was likely to assume gigantic proportions from both the financial and engineering aspects and it was not proceeded with.

It is worthy of note that the operations of Main Roads Commission Engineers took them to many points rich in historic associations. The "backbone" road just mentioned, for instance, would have traversed much of the country covered by the brothers Frank and Alex Jardine in 1864-65, when they trekked with a mob of cattle and a number of horses from Rockhampton to the top of Cape York, where the settlement of Somerset had been established and their father John Jardine appointed Resident Magistrate. Shadowed by hostile blacks, with whom they had several unavoidable encounters, they won through at last. Let it not be forgotten, too, that the Jacky Jacky River, the terminal point of the

proposed road, was so called to perpetuate the memory of the gallant aboriginal who shared the dangers of explorer Kennedy on his last ill-fated expedition and was with him when he died.

A Notable Reconnaissance.

Although the road from Mungana to Jacky Jacky (596 miles) was not built, consideration of the project had one result which may be accepted as of national importance. This consisted of a reconnaisance of the Cape York Peninsula and the islands to the north by Lieut. F. W. Whitehouse, D.Sc., D.Ph., Lecturer in Geology at the University of Queensland and Intelligence Officer, Royal Engineers, H.Q. First Australian Army. In a report on his observations Dr. Whitehouse not only dealt with the possibilities of improved alignment for a military road and the conditions at existing and future airfield sites, but he described the main geological and physical features, computed the flow of streams, analysed the waters, both flowing and otherwise, and collected over 1,000 plants for examination by the Government Botanist. The report was accompanied by maps showing the approximate distribution of different types of country on the Peninsula and the letterpress contained a number of extracts from scientific journals, not easily accessible to the general public. Much information was also given relating to the Torres Straits islands. In any scheme for the development of the Peninsula, Dr. Whitehouse's report should be of incalculable value.

Access Roads.

The construction of access roads was a feature of all jobs allotted to the Main Roads Commission and included the following in addition to those not mentioned in connection with particular undertakings:—

A road across the northern end of Stradbroke Island from Amity Point to Point Lookout for the transport of stores and petrol.

Access roads built and store sites prepared at the Caloundra end of Pumice Stone Passage, roads built to the military hospital at Ekibin, Holland Park, Greenslopes, and Windsor, the Crosby Park Chemical Warfare Centre, the U.S.A. Motor Pool at St. Paul's Terrace, the A.W.A.S. Camp at Indooroopilly, a wheat-storage area at Eagle Junction, also access roads at Victoria Park and Gregory Terrace camp areas, and a prisoners of war camp at Gaythorne.

Roads, paths and paved areas were laid down to provide access to R.A.A.F. stores depot at Drayton.

Approximately 44 miles of roadway were constructed for an American Army camp at Strathpine and a main road through the camp was surfaced with blade mix bitumen for 4½ miles.

Access roads were built to American Army rest camps at Coolangatta, Caloundra, and Samson Vale.

In the Central district access roads were built and sites prepared with paths and drainage for army warehouses at Parkhurst, ration stores at Stanwell, Emerald, and Duaringa, and a temporary hutted camp at Rockhampton where the Public Works Department erected 37 huts.

An amount of £22,421 was the estimated cost of providing an access road to the Experimental Station at Proserpine with a rock-filled timber dam and a railway ramp at Gunyarra in addition to work on adjacent roads.

At Macrossan Stores Depot an access road, paved areas, and paths were provided to two large store buildings, four Bellman hangars, and one inflammable store.

Grading and filling work in preparing the site for an H Class Mess, 4th Air Depot, filling in and gravelling a motor park, building access road to a motor dump, also levelling and gravelling a site for an American Red Cross canteen were among the jobs executed at Garbutt.

Road formation and drainage was provided at the Atherton Showgrounds for an Australian army canteen, also preparation of site for igloo hut.

An access road and hardstanding was carried out at an inland reserve fuel depot at Hughenden.

For an R.A.A.F. operational base at Cooktown the Main Roads Commission built an access road from the Laura-Cooktown Railway also roads to camp buildings and water reticulation.

At an R.A.A.F. operational centre, Horn Island, the building sites were cleared, approach roads and paths built, and stormwater drainage provided.

An all-weather road of 4.6 miles was constructed at Jacky Jacky to give access to the Radio Range.

Road Maintenance.

It was found that roads under heavy military traffic deteriorated rapidly and it was necessary to make special provision for repairs and mantenance on roads not officially classified as strategic roads. In the main it was not considered economical to carry out this work by special organisations and the local authorities co-operated by making their engineers, men, and plant available where possible.

Road maintenance was carried out for U.S.A. installations at Camp Columbia, Indooroopilly, Darra ordnance depot, Camp Muckley, Blunder road camp, Meeandah warehouse area, Eagle Farm airfield, Banyo warehouse area, Geebung small arms store, Holland Park and Ekibin hospitals, Moorooka and Gregory terrace camps, Calvert and Columboola ordnance depots, Hemmant transmitting station, Archerfield road, Stuartholme, 172 Station Hospital, Rocklea road, and Archerfield motor pool.

Camp Facilities.

Facilities of good standard were provided for the men employed at all C.C.C. and Main Roads Commission camps wherever situated. In addition to sleeping and washing accommodation mess huts were provided where the men could take their meals or spend their evenings reading, writing, and listening to radio programmes. The various awards provided for free food and quarters in addition to their wage, with an allowance which varied from time to time, under changing awards, from £1 1s. to £1 12s. 6d. for men who did not avail themselves of the camp facilities. Cooking stoves and all requisite kitchen equipment were provided, whilst cooks and kitchen staff were paid by C.C.C. or Main Roads Commission. Food of the best quality was supplied by these authorities. At all camps of any size canteens were established where essential commodities and some luxuries could be purchased.

CHAPTER 5.

AERODROMES.

Of vital importance in the defences of our far-flung territories and the successful prosecution of the war was the prompt provision of adequate facilities for the operation of the Australian, American, and Dutch Air Forces. There had been a considerable amount of work done in the construction of aerodromes at various centres to meet the needs of commercial aviation, but war created an entirely new situation which called for the immediate extension of existing dromes and strengthening them to meet the needs of heavy bombers and fighters, the construction of a number of new dromes in forward areas, of landing strips, approaches, hideouts, repair facilities; also supply and oil-storage bases in remote regions extending as far as Normanton, the tip of Cape York, and several of the islands in Torres Straits, where the nature of the terrain, the materials available, and the difficulties of transport required expert investigation.

The Main Roads Commission undertook all necessary surveys and helped in the selection of sites having in view the general characteristics in each case as well as flying and visibility. It was a fortunate circumstance that over a period of years the Main Roads Commission had given much attention to the constitution and bearing capacity of various soils throughout Queensland and was in fact one of the first in the field in this important branch of road-building science. The knowledge thus acquired proved of inestimable value in the selection of sites and the construction of flying strips, taxiways, access roads, and the determination of the most suitable paving material to be used in each case. The essence of the contract in all such work was speed; in fact, some of the dromes were so important that any failure to have them completed on schedule might conceivably have led to the loss of the country. However, all demands were met to the satisfaction of the Defence authorities, in some cases with the collaboration of the local authorities. When the Allied Works Council came into being with the Hon. E. G. Theodore as Director-General, the Main Roads Commissioner, Mr. J. R. Kemp, was appointed Deputy Director-General in Queensland and from that point Defence work was carried on by direction of and in collaboration with the Allied Works Council. Many of the flight strips constructed by the Main Roads Commission, in Northern Queensland particularly, were used in the decisive air and sea battles to the north and north-east of Australia and their construction in quick time contributed largely to the successful outcome of these engagements. The Commission received many letters of congratulation on the speed and merit of the work done. A senior officer of the Allied Forces in Australia wrote to the Commissioner:—

> *I wish to express my very great appreciation of the special efforts put forward by yourself and members of your organisation and the construction agencies concerned. The efforts of all those engaged upon these very important projects have materially aided the tactical units concerned in carrying out their missions against the enemy.*

Archerfield.

The work of extending and improving Queensland's main airport at Archerfield begun in 1940 continued into 1946 with Australian and American airmen in occupation throughout. The total cost amounted to £207,429 with a maximum of 300 men employed. The task comprised extensions to the flying field, laying down tarmac areas, hardstandings and a large cement penetration section, workshop sites, and access roads. For extensions to the field, tracts of forest were cleared and a number of houses moved to new sites. A section of the Oxley-Coopers Plains road which bisected the drome was obliterated and a deviation made. Wide taxiways and dispersal areas were laid and bitumen surfaced sections provided, also sites for and the erection of workshops, subsidiary buildings, and large igloos. Consolidation of foundations was carried out on a low-lying field adjacent to the drome used by the Department of Aircraft Production for the repair of combat planes. Special attention had to be paid to this area as it was subject to inundation.

Eagle Farm Aerodrome.

A transformation greater than that at Archerfield was effected at the Eagle Farm aerodrome in the face of many difficulties. This work was commenced in February, 1942, and continued to the end of 1944, the expenditure approximating £559,687, and employing up to 287 men. Three runways, taxiways, hardstanding, and extensive drainage were involved. Eleven houses were removed and re-erected. A total of 22,320 ft. of 24-inch diameter reinforced concrete pipes was laid and practically the whole of the north side of Brisbane for a distance of 12 miles was cleared of big gravel deposits for use in consolidating the plastic delta material upon which the field was built. The N.E.-S.W. runway was 3,000 ft. long and 150 feet wide with flanks of 225 feet, or 600 feet overall width. A week after the work of construction had started heavy rain fell and continued for nearly three weeks, converting the ground to a quagmire. Thousands of feet of ashes and coke breeze were carted from the gasworks and deposited in order to keep trucks moving with borrow material from Nudgee. On several occasions two fire brigade pumps were used to get the water from the boxing.

About this time the American authorities advised that the runway was urgently needed for fighter plane protection of Brisbane. With the clearing of the weather, two 10-hour shifts were set to work, using 100 trucks, which hauled 33,000 cubic yards of borrow material over a 5-mile lead, 12,000 cubic yards of gravel over a 6-mile lead and 1,250 cubic yards of screenings for bitumen on leads of up to 55 miles. This section was completed and a squadron of P.39 (Air Cobras) landed on Sunday afternoon, 29th March, 1942.

The N.W.-S.E. runway of similar dimensions to 1 N.E.-S.W. runway, with two connecting taxiways 1 mile in length by 50 feet wide were completed in May. From this stage

the airfield was developed by lengthening the N.E.-S.W. runway to 6,000 feet, the N.W.-S.E. to 5,000 feet and a new E.-W. runway was constructed 7,200 feet long with taxiways, hardstanding, and field drainage. The total quantities used comprised 1,094,892 cubic yards of earthworks imported, 232,528 cubic yards of D class gravel and 17,072 cubic yards of screenings for bitumen. The total area of bitumen work was 141 acres.

In September, 1943, the C.O., Fifth Air Force Service, received a letter from Lieutenant-General George C. Kenny, who wrote:—

> *The Lae offensive sharply increased our immediate need for fighter aircraft at a time when over* 100 *such were in course of erection in Brisbane. The situation was such that no matter how fast these fighters were turned out it could not be fast enough from the tactical standpoint. Action taken by the Fifth Air Force Service Command to meet this critical situation resulted in fighter aircraft being erected and delivered at a rate greater than ever before achieved in this theatre and exceeding our most optimistic schedule. The speedy delivery of these fighter aircraft contributed largely to the successful conclusion of the Lae Campaign.*

In handing a copy of this letter to the Main Roads Commission the C.O. at Eagle Farm said that the Commission shared in the honours by reason of their speedy and efficient construction of this field.

Amberley.

An amount of £342,827 was the approximate value of work carried out at Amberley from October, 1940, to October, 1945, employing a maximum of 168 men. Operations consisted of clearing and grubbing, construction of two runways 7,000 feet and 4,500 feet long and 150 feet wide, three taxiways 2½ miles long and 50 feet wide, tarmac areas and foundations for 12 hangars, roads and paths in camp area, roads to wireless station and power-house, taxiways to hideouts, &c. The runways and taxiways were constructed to take only medium planes, but with the advent of the heavier bombers it became necessary to strengthen these with 3 inches of bitumen bladed mix. A site was also prepared for an. R.A.A.F. remote control receiving station.

Goolman.

To take the overflow from Amberley a relief landing ground was constructed at Goolman, where the approximate cost amounted to £41,631. Difficulty was experienced in selecting a site. The first and second considered were found to be covered with water after rain, and higher ground having been decided upon one runway instead of two as originally planned was built. This was 5,200 feet long, 150 feet wide with short dispersal runways, the whole constructed of decomposed granite. Started on 30th March, 1942, the work was completed in May, 1943, and employed a maximum of 83 men.

Strathpine (Lawnton).

In May, 1943, aerodrome facilities were required for an R.A.A.F. operational base at Strathpine. A bitumen surfaced runway of 4,200 feet was laid down in virgin forest country necessitating a great deal of clearing, felling, and grubbing, also a No. 2 strip of 3,900 feet by 150 feet, gravelled and sealed. Roads, taxiways, and 24 hideouts were included in the job at an estimated cost of £22,162.

Waterford and Loganlea.

In 1942 a landing strip and dispersal area was constructed at Waterford by the Main Roads Commision at an estimated cost of £3,906. The work included a deviation of the Waterford road, and the rerouting of portion of a power line by the City Electric Light Co. was also necessary. A similar landing strip was constructed at Loganlea.

Lowood.

The construction of an aerodrome at Lowood in the Upper Brisbane Valley, commenced in September, 1941, and on completion the work of maintenance and repairs went on to 1945, with an approximate expenditure of £149,274. Clearing, grubbing, and grading provided an all-over landing field with a 6,000 feet by 150 feet runway, taxiways, dispersal strips, and hardstanding. The Americans used the field for a few months in the middle of 1942, but the surface did not please their pilots and a further landing strip was provided for them west of Coominya. The R.A.A.F. again took over the Lowood drome in September, 1942, with heavier machines. The maximum of men employed by the Main Roads Commission on this job was 181.

Coominya.

A landing ground at Coominya, as a relief to the Lowood drome, was authorised late in 1941 and work began early in 1942. It included clearing, grubbing, surface formation, the preparation of a landing strip, with taxiway, dispersal strips, and hideouts in heavy timber, also fencing, draining with reinforced concrete pipes, and the construction of a half-mile access road, approximate cost £11,449.

Toogoolawah.

Toogoolawah was provided with an aerodrome in 1943 at an approximate cost of £25,866. Two runways, one of 5,000 feet and one of 3,600 feet, were formed and about 2,000 feet of longitudinal collection drain pipes provided with transverse pipe drains under the runway. The value of this undertaking was demonstrated shortly after the first runway was gravelled when a large U.S. bomber which had run out of petrol in bad weather was able to make a forced landing. Operations included fencing the drome, clearing and levelling the approaches. Maximum number of men employed 92.

Oakey.

Provision of an aerodrome at Oakey involved the construction of two runways 5,000 feet and 6,000 feet by 150 feet, workshop and camp areas, roads, drainage, &c., besides a good deal of filling in at the camp and hospital areas. The work occupied from March 1943, to May,

1945, and employed a maximum of 181 men. An R.A.A.F. camp and depot was also established at Oakey, with bitumen roads and paths and drainage.

Toowoomba.

Work on the Toowoomba aerodrome consisted of harrowing, undercutting, and grading to form four landing strips with some attention to runways and fencing.

Leyburn and Jondaryan.

The construction of an aerodrome at Leyburn was one of the most important tasks carried out west of Brisbane, the total cost running to £132,946. Soil conditions on the site proved to be good with no lack of suitable gravel in the vicinity. Good water was obtained from two bores put down in the drome area supplemented by pumping from Canal Creek. Work was started in March, 1942, and after some preliminary grading an emergency runway was quickly provided capable of carrying heavy bomber aircraft. Work was then pushed ahead to provide camping facilities, construct two permanent runways of 7,500 feet, and 5,400 feet respectively with a width of 150 feet taxiways, splinter-proof and camouflaged hideouts, drainage, access roads, and the widening of existing roads. Repair and maintenance work continued until the end of hostilities.

A heavy bomber field similar to that at Leyburn was also constructed at Jondaryan (Brymaroo).

Condamine and Cecil Plains.

Construction of a new aerodrome at Condamine was begun on 28th March, 1942 and completed 14 months later at an approximate cost of £89,230. The work consisted of clearing and grubbing, forming and gravelling runways and taxiways, and bitumen sealing areas on taxiways and runways. The base course for the runways was made up of a mixture of clayey soil from a cutting in one of the runways with the sandy overburden from the metal pit. Laterite was used as a surfacing course on one runway, studded with coarse gravel reinforcing. A bad gravel surface on one runway was disintegrated by application of the tar and reinforcing became necessary. A 7,000 feet runway was cleared and made usable by filling stump holes and rolling. Another of 5,000 feet was graded and surfaced with laterite. Later an artifical loam base was laid on the longer runway, also a gravel top course. Pavement width of runways was 150 feet and taxiways 50 feet. The area of bitumen surfacing totalled 23 acres. The maximum number of men employed was 189.

An aerodrome with accommodation similar to that at Condamine was constructed at Cecil Plains at an approximate cost of £56,991.

Maryborough.

At Maryborough three runways were paved and bitumen surfaced and a tarmac area of 40½ acres laid in addition to numerous subsidiary works. Owing to the nature of the foundations and the use of the field by heavy carrier planes, a considerable amount of maintenance work became necessary. Expenditure on the original construction amounted to £113,000, and on subsidiary work a further £35,000 approximately. An average of 130 men was employed for a little over 12 months with a maximum of 400.

Bundaberg.

The original work at the Bundaberg aerodrome consisted mainly of preparing an all-over field with a paved runway and dispersal areas, taxiways, and satellite landing strips. An average of 125 men was employed for 12 months with a maximum of 205. Expenditure on the main field was approximately £94,000. Subsidiary work included landing strips at Moorlands and Meadowvale at a cost of £44,000.

Kingaroy.

At Kingaroy the preparation of an "all-over" field together with hangar floors and access roads, with minor subsidiary works, employed an average of 80 men for a little under 12 months, with a maximum of 170 at any one period. Total expenditure, £55,000. The Main Roads Commission also carried out the construction of a dam on the Stuart River to supply water for the town and the drome.

Charleville.

The work of enlarging the previously existing civil aerodrome at Charleville began in December, 1941, and was finished in January, 1943. It consisted of clearing, grubbing, grading, gravelling, drainage and bitumen surfacing, the construction of taxiways and dispersal strips, besides excavations for large fuel tanks and the preparation of building sites. The first runway of 6,000 feet was completed to a stage suitable for aircraft landings within a week. Three gravelled runways in all were constructed and 88 acres of bitumen surfacing completed. Dust proved a nuisance and molasses spraying was tried with fair success. The maximum number of men employed was 335 and the approximate value of the work was £228,300.

Cunnamulla.

The construction of this aerodrome was undertaken in July, 1942, on behalf of the U.S.A., and was intended as a major project. An alteration in the war situation, however, led to the construction of only one of the three runways originally planned. This runway, 5,000 feet long, was built of gravel and did not receive any bitumen surfacing.

Owing to the fine sandy soil upon which the strip was built, considerable difficulty was experienced in consolidating the metal bed. It was found necessary to water the bed and immediately turn the material over with a grader to conserve the moisture. The whole was then sheepsfoot rolled.

Water supply was obtained by constructing 9,000 feet of bore drain across a swamp. To do this the swamp was formed and sheepsfoot rolled. Frequent dust storms caused a hold up of the work, and on one occasion huts were destroyed. The job, which was supervised from Charleville, employed a maximum of 97 men, and was completed in four months at an estimated cost of £33,000.

Rockhampton.

Operations on the Rockhampton aerodrome and R.A.A.F. operational base were carried on almost continuously from early in 1942 to the cessation of hostilities. An area of about 500 acres of hush-a-bye country was cleared and levelled and emergency runways constructed.

These were later widened and lengthened and finally repaved and surfaced with bitumen. The field was also extended from time to time by clearing, levelling, and draining additional areas. Military installations such as gun emplacements, mine tunnels, dispersal areas, and ammunition storage facilities were provided, also a communication centre, operational base, and an R.A.A.F. hutted camp constructed with roads, footpaths, and drainage. The use of pavement materials of different colours improved camouflage values, to which close attention was given in the camp itself. The approximate value of this job amounted to £185,000 and the men employed reached a maximum of 770.

Longreach.

Clearing, formation, drainage, and gravelling was carried out from 9th February, 1942, in the construction of an aerodrome at Longreach which provided an important landing ground on the inland ferry route and operations in the Pacific air battles. The drome was located on rolling downs country where good paving material was difficult to obtain and considerable investigation was necessary as at Blackall, to determine what was best to be used. The approximate cost amounted to £75,545 and a maximum of 130 men employed.

Winton.

Complementary to the Longreach drome on the inland ferry route another was built at Winton at an approximate cost of £28,000. Started on 1st August, 1942 the job consisted of clearing, formation, drainage, and gravelling and was completed in four months. The maximum number of men employed was 73 and two shifts were worked for the greater part of the job.

Blackall.

Work on a new aerodrome at Blackall continued from August, 1942, to March, 1943, and the estimated cost was £46,000, with a maximum of 60 men employed. Two runways were constructed, one earth surfaced and the other paved. Gravel for the job was obtainable only on long leads and in limited quantity though much inferior material was fairly handy. The situation led to a series of laboratory tests which indicated that various mixtures of loam, grit, and gravel were likely to produce a reasonably good pavement. In each case the answer seemed to lie in increasing the fines and achieving greater density, thus excluding excessive moisture. However, the tests were not regarded as convincing and gravel from Duneira was used. A report by the officer in charge set out that after experiments covering about four years:—

"Evidence is accumulating that a rather high proportion of clayey fines can be used to counteract dry weather ravelling and corrugation without detracting from wet weather performance, provided that a dense grading is obtained."

Mackay.

Improvements to the existing civil aerodrome were asked for by the Department of the Interior in 1942 and work began in April of that year, the Mackay City Council acting for a time as the constructing authority under the direction of the Main Roads Commission. When the Mackay City Council needed the full time service of its staff the work was continued under the direct supervision of Main Roads Commission officers. It consisted of widening, lengthening, and resealing the existing runway, clearing, grubbing, and filling an extension area, the construction of a second and subsequently a third runway, access roads to drome and bomb store, splinter-proof hideouts and buildings, the sealing of aprons and taxiways. A considerable amount of drain construction was involved. Seasonal rains and lack of plant interrupted the work at times. The approximate total cost was £81,524 and the maximum of men employed 125.

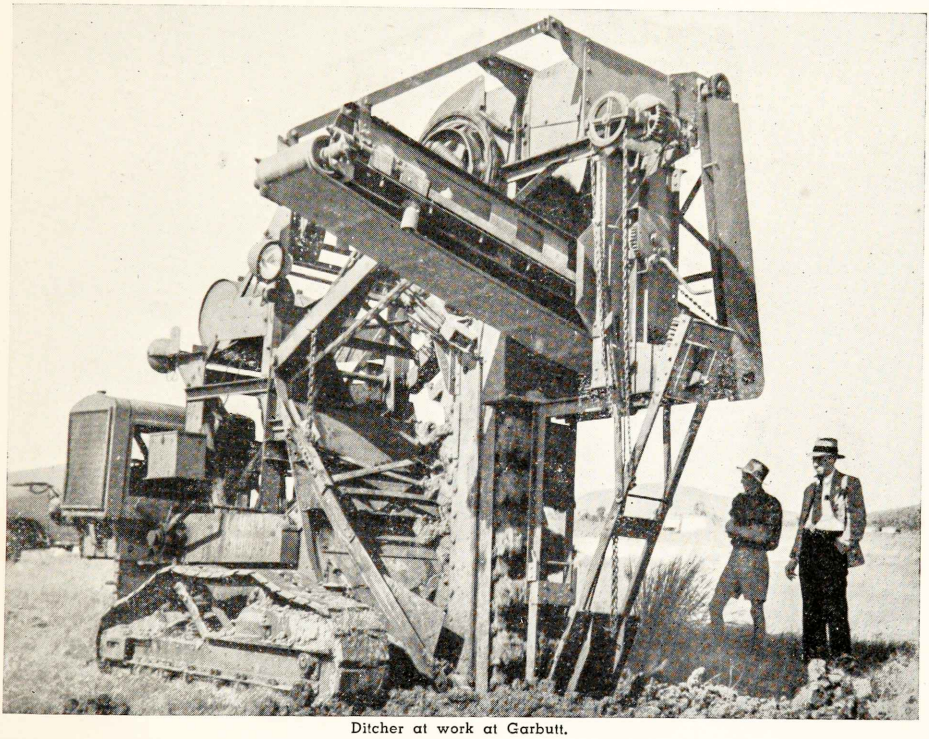
Bowen.

An aerodrome adequate to the needs of commercial air traffic in 1938-9 was built by the Bowen Town Council and the Wangaratta Shire Council, with the aid of Commonwealth and State Government advances, and it was subsequently improved through the same agencies. It still fell short of requirements for an R.A.A.F. operational base, however, and it was taken over by the Defence authorities in preference to certain alternate sites suggested. It was accordingly redesigned and extended by the resumption of adjoining lands and the diversion of the Bowen-Delta and Bowen-Don roads. Sections of these roads passing through the resumed area were broken up and levelled, fences removed to the new boundaries, with much clearing and grubbing, and the movement of 28,300 cubic yards of earth to alter the contours of the field. The existing runway was widened and resurfaced and a new runway with two taxistrips provided. Flood alleviation work included the construction of culverts under the Proserpine railway and Bowen-Don road and raising the level of the roads diverted to the north and west of the drome. Additional taxiways, splinter-proof pens, and slit trenches were provided at a later stage, the Main Roads Commission carrying out all the work.

Townsville.

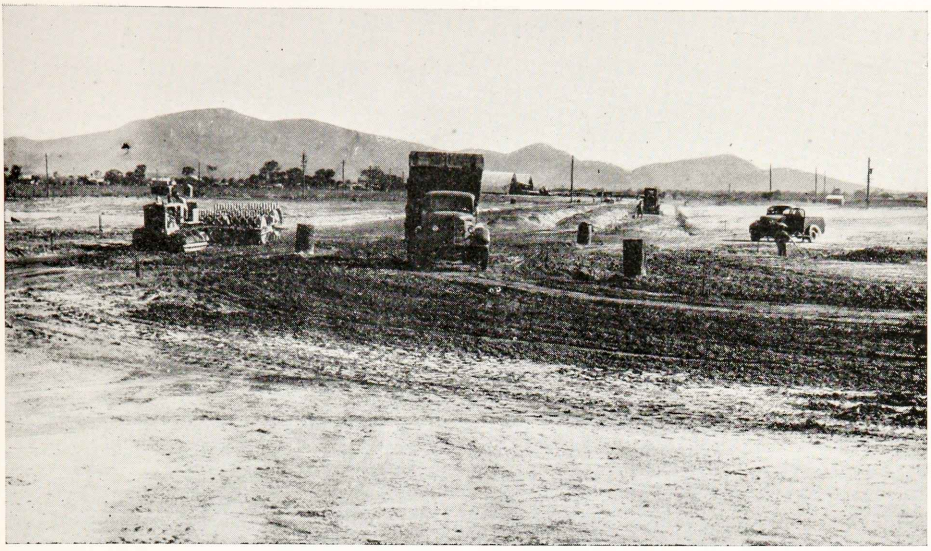
The aerodrome at Garbutt near Townsville was originally constructed as a lightly gravelled runway job with a pavement 100 feet wide to carry service aircraft. On the establishment of an R.A.A.F. station there the width of the runways was increased to 150 feet. In November, 1941, the Commonwealth Works Department asked for three runways to be extended to 5,000 feet, the work to be done by the Main Roads Commission instead of by the Townsville City Council as formerly. The increased length was needed for Lockheed Hudson bombers and Flying Fortresses, which required to reach a high rate of speed before leaving the ground. Soil tests were made and pavement thicknesses decided upon in accordance with normal Main Roads Commission practice, modified to allow for increased weight pressure by planes with wheel load intensities of 6 tons per square foot. Six weeks were allowed for the completion of this portion of a task that was to lead to the development of one of our largest airfields, used extensively by U.S.A., Dutch, and R.A.A.F. fighters. Gravel for this job was obtained from the Townsville City Council and Bohle River quarries and available plant was supplemented by adjacent local authorities. Flood lighting was installed and by working three shifts the task with all that it involved in the way of clearing, grubbing, forming, and draining was completed within the

Tractor drawn scoop at work on gravel deposits for use on runway to U.S.A. Repair Depot at Garbutt, Townsville.

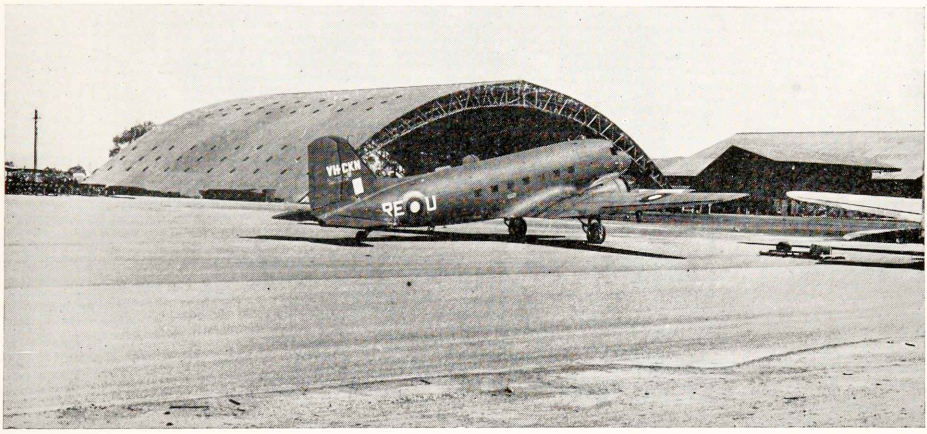


Ditcher at work at Garbutt.

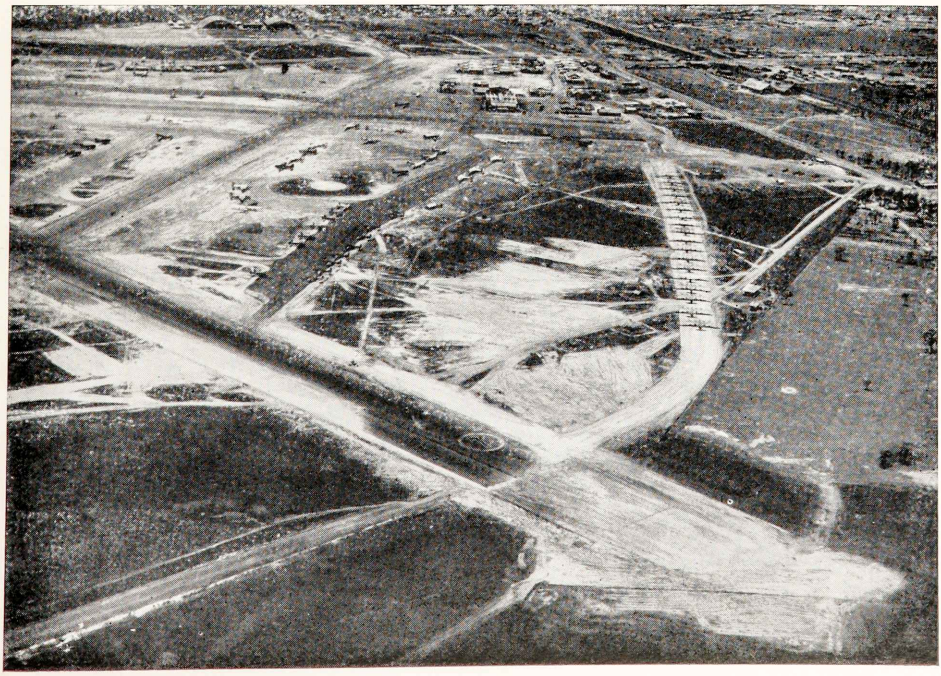
Drainage pipes for use in Aerodrome construction.



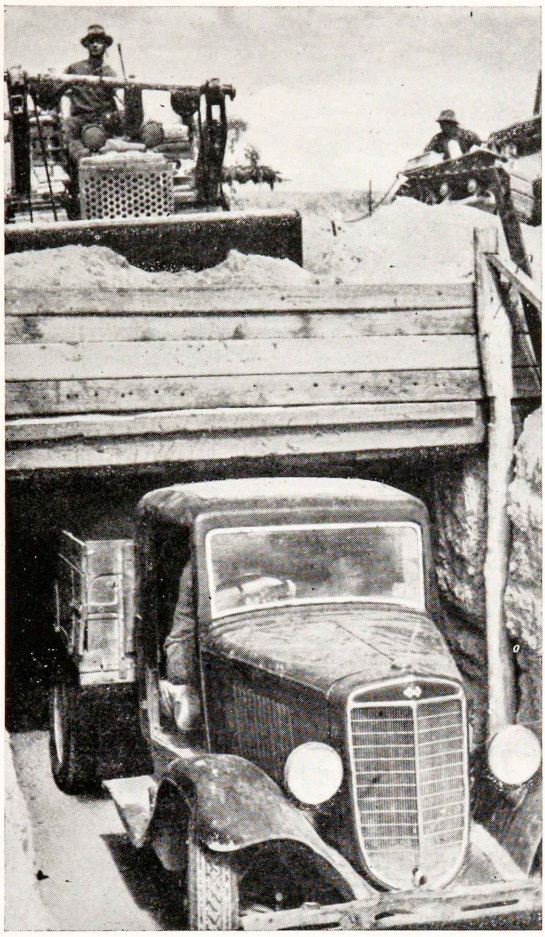
Construction of taxiway connecting new hangars with runway.



Hangars and tarmac newly completed for R.A.A.F. Transport Squadron.



Aerial view looking South with line up of 18 Liberator bombers at right centre.



"Chinaman" loading spoil during construction.

Spreading gravel on freshly bitumened surface.

specified time. At one stage gravel was delivered to Garbutt at the rate of 4,000 cubic yards per day.

At this period the landing strips used by bomber aircraft flying between America and Australia were at Midway, Wake, and the Hawaiian Islands. Developments in the Pacific, however, made it necessary to change to Honolulu and Fiji with Townsville as the Australian terminus and operational base. This led to an immediate addition of further strength to landing strips, laying foundations for the American hangars and other buildings, with additional taxiways, dispersal points, inspection pits, and hideouts. This was followed by a general regrading of the whole area, the construction of splinter-proof shelters and slit trenches for use in case of enemy action, caches for petrol drums, water supply and storage, access roads and approaches to remote control and meteorological stations.

A Fine Spirit.—The ever-recurring demand for speed in carrying out various works entrusted to the Main Roads Commission was particularly urgent in the case of the air strips required as satellites to the Garbutt field. Most of these were placed in forest country which required clearing and levelling whilst leaving ample tree cover. There was no time to provide more than the most elementary mess and camping facilities, but this in no way detracted from the all-out effort of the men engaged on the work, who were actuated largely by a sense of patriotism in their endeavours to complete each job on time.

This spirit was not confined to the men under direct control. Well-to-do sugar-cane farmers took their place beside the men of the Australian Workers' Union in carrying out urgent jobs, and tractors and trucks which could ill be spared from essential work on their farms were placed at the disposal of the Commission. Descendants of all nationalities—Maltese, Yugoslavs, Spaniards, and Italians—played their part and justified their claim to Australian citizenship. Timber cutters, loggers, and carters, sawmill owners, joinery workers, and men engaged in many other vocations without exception showed the same admirable spirit. Plant made available by these people was in many instances purchased at a later date by the Commission, and it may be some satisfaction to the original owners to know that it proved invaluable, not only on Australian territory, but on aerodrome construction at Milne Bay, which contributed largely to the defeat of the enemy at that point.

Appreciation.—No apology is needed for the insertion of the following letter from Headquarters, Advance Echelon, Air Service Command, Fifth Air Force, dated 5th May, 1944, and addressed to Mr. J. R. Kemp, Deputy Director-General, Allied Works Council, Brisbane:—

> *Dear Sir,—Last September I was instructed by the Commanding General, Allied Air Forces, to start construction and installation of an Air Depot at Townsville. Time was the essence to make this project successful and in view of the major part it was to play in the successful operation of the Air Forces for overhaul, supply, and maintenance, in order to accomplish the project successfully, it naturally required the assistance of other agencies. This Depot has been operating for the past several months and has continued to expand.*
>
> *I am taking this opportunity of bringing to your attention that the work performed by the Main Roads Commission has contributed to the success and early completion of the Depot. I cannot let this opportunity go by without expressing my appreciation for the co-operation we have received. Further, I desire to bring to your attention the co-operation received from your representatives, Mr. J. C. Mathison, District Engineer, Main Roads Commission, and Mr. E. N. Wilson, Resident Engineer. Mr. Wilson has been most co-operative in assisting in the layout of roads, parking areas, and by his direction, with untiring efforts, has displayed organisation ability and efficiency that has been most satisfactory.*
>
> *I find in many cases civilian operators in wartime receive very little recognition for their efforts, and I trust you will find it within the policy of your organisation to express to these gentlemen our appreciation for the services they have rendered towards this project.*
>
> (*Sgd.*) *V. E. BERTRANDIAS,*
> *Colonel, Air Corps, Commanding.*

Auxiliary Dromes.

The construction of an interceptor fighter field at Antil Plains, near Townsville, was requisitioned early in 1942. This involved the construction of two flight strips each 5,000 feet long and 150 feet wide with approaches, taxiways, dispersal strips, hardstandings, and camp accommodation for two squadrons with access roads, paths, and fencing. Flight strips and taxiways were laid to a strength to accommodate the heaviest types of aircraft.

Fields similar to the above were constructed at Stock Route, Woodstock, Upper Ross River, Fanning, Bohle River, and Reid River, with landing strips and the requisite accessories at Aitkenvale and Mount St. John. Three shifts of men were sometimes employed to allow of the work being completed to time.

Charters Towers.

In September, 1941, sites for an aerodrome to accommodate heavy bombers and combat planes of the R.A.A.F. were examined in the vicinity of Charters Towers. Work started in February, 1942, with construction of temporary landing strips, two at the old football grounds and one near the cemetery, for use whilst the 'drome proper was under construction. The site for the main aerodrome was located on the top of a series of ridges to the north-east of Charters Towers city. This site was also used extensively by the U.S.A.A.F.

Due to the configuration of the ground, the construction of the two 6,000 feet long landing strips on this aerodrome involved unusually large cuts and fills of up to 10 feet, and earthwork quantities approaching 250,000 cubic yards for each runway strip.

Dead line for the completion of the first strip was fourteen days, it having been decided by

Military authorities that the Garbutt airfield on the coast was too vulnerable to enemy action for use at this stage of the war.

Hangars, repair shops, huts, and all the requisites for a large airfield were later erected at this aerodrome. Disused tunnels of old gold-mines were used for storing explosives, ammunition, and petrol, and some of the buildings were well obscured from view among old mine dumps. Foundations for four 1,000,000-gallon oil storage tanks were built and well camouflaged.

Co-ordinated Effort.—It is worthy of note that the call for the construction of the first strips at Charters Towers reached Townsville at 10 o'clock on a Saturday night. The Commissioner who was present in Townsville had intended to raise some objection to the site owing to its configuration, but upon receipt of an urgent signal he directed that operations commence forthwith. The General Manager of the North Queensland Railways was accordingly called from his bed, and with the ready spirit always displayed by his Department in such matters he had special trains assembled at Garbutt Siding by 4 o'clock next morning and by 6 a.m. on Monday hundreds of men with engineers, foremen, and clerks had been assembled. All available earth-moving plant had been loaded on to the trains and by the end of the day operations were in full swing at Charters Towers. The construction of two runways to receive heavy bombers involved the movement of 250,000 cubic yards of earth with cuts as deep as 8 feet and fills up to 10 feet. The job was completed in 17 days and was in use by bombers and heavy fighters soon after.

Breddan.

A supplementary drome was constructed at Breddan, some miles from Charters Towers. This was developed later into a first-class fighter field with a 7,000 feet flight strip, dive bomber landing strip, runways, gun pits, replacement area camp accommodation, and other buildings. Auxiliary strips were also provided at Fanning and Southern Cross. Alterations, extensions, repairs and general maintenance work at all of these dromes was carried out by the Main Roads Commission.

Macrossan.

A fighter and repair field for the R.A.A.F. was prepared at Macrossan in 1943 with flight strip, taxiways, hardstanding, and the usual accessories, also preparation of the site and the erection of a 12,000 gallon petrol tank, and the placing of five water tanks.

Cairns Aerodrome.

A civil aerodrome originally constructed by the Cairns City Council was due for extensive improvement in 1939, and after a proposal to secure a new site had been put aside owing to the urgency of the job, a sum of £5,000 was spent upon it under the Council's supervision. As the war developed, the importance of the drome from the standpoint of defence became apparent and made it imperative that an immense amount of work must be carried out. This was done by the Main Roads Commission and local contractors by arrangement with the Allied Works Council and the Department of Civil Aviation. The landing field was extended by clearing a considerable area of light undergrowth, and mangroves leading to the landing strips were felled to ground level. Three additional landing strips were constructed, an existing levee bank replaced by a higher levee wall protected with broken stone, double flood gates installed in the levee wall, existing drains lifted, pipes and timber stacked, and an open drain constructed inside the levee wall.

The job was divided into sections and the progress made was illustrated in a letter addressed by Mr. A. B. Corbett, then Director of Civil Aviation, to the secretary of the Commission under date 13th January, 1941. Referring to the completion of the first section during the last four months of 1940, at a cost of £20,081, Mr. Corbett wrote:

> *I fully appreciate the significance of this. In preliminary discussions between your engineer, Mr. O. F. Anderson, and the officers of the Department, Mr. Anderson said that provided the work was started before the end of August he would complete it before the wet season in December at a cost of* £20,000. *The work included placing* 120,000 *cubic yards of material and your actual cost of less than 3s. per cubic yard is far below contract prices for similar work at this drome. The total cost is* 0.5 *per cent. over the estimate and had there been no hold up in the delivery of floodgates it would have been under the estimate.*
>
> *More important still is the question of time. If this stage had not been completed before the wet season, Cairns Aerodrome would have been out of action to the R.A.A.F. and all but the lighter planes for weeks if not months. To achieve this completion it is understood that your Commission was at times placing on the drome* 5,000 *cubic yards of material per day with a lead of one and a half miles. I wish to thank your Commission for the way in which this work was carried out and for your ready co-operation in all matters concerning this job. By your efforts the aerodrome has been open to all R.A.A.F. and civil aircraft throughout the wet season. Furthermore, at no time during construction was normal air traffic impeded in any way. In this case I would like to refer specifically to the work of your engineer at Cairns, Mr. O. F. Anderson. Reports from my officers indicate that his organisation has been masterly and all officers of this Department who have come in contact with him speak of his co-operation in all matters. Furthermore, he did what he said he would do.*

Progress on other sections was continued with consideration and despatch, Dr. K. N. E. Bradfield of the Department of Civil Aviation, in one of his reports, remarking that the Cairns Aerodrome was one of the most satisfactory jobs he had seen in the Commonwealth in relation to organisation, speed in construction, and costs. Further extensive work was carried out at this drome by providing additional taxiways, runways, constructing splinter-proof pens, caches for petrol drums, slit trenches for use in the event of attack, strengthening the levee wall, &c. The estimated cost of the work was approximately £87,241.

Mareeba.

Time was the important factor in a majority of the tasks undertaken by the Main Roads Commission. For instance, in the construction of an aerodrome at Mareeba, the Commission was requested to have an air strip ready for the use of heavy bombers in eight days. At that time there was no Main Roads Commission plant at Mareeba, the nearest being at Herberton. Steps taken were so effective, however, that the strip of 7,400 feet by 200 feet was in use within the time limit. A second strip was then laid down of similar length and width, with a seal coated taxiway between the two. Buildings were erected for squadron offices and operational centre, sites prepared for four camps, with mess huts, stores, kitchen, ablutions, &c., at each camp; also wireless transmitting hut, refrigeration room, dispersal points, and hideouts. Dispersal road totalled 14 miles in length.

Suitable screenings for bitumen work being unobtainable, a method of washing and screening local quartz deposits was used to produce some thousands of cubic yards, the reject sizes being used for drainage and concrete work. Continual watering proved ineffective in laying the dust, which affected both flying and constructional operations. This was eventually overcome by spraying with a mixture of one part of molasses to four of water.

Further work at Mareeba included the construction of 15 additional heavy bomber hideouts, cost £16,200; an Army Airways radio station buildings and water supply, &c., £3,521; camp for U.S. material squadron, £2,850; camp for 500 men, £2,650; camp for 46th service group, £2,700; camp for material squadron, £3,150; access road to radio range, £1,750; concrete purification plants £1,200; 2,500 gallon petrol tank, £427; and three bomb sight buildings, £1,440; water purification for 2nd station hospital, £850; dispensary building, £520; accommodation headquarters, A.A. battery £620; and administration hut, £550. The approximate cost of all work at Mareeba ran to £353,000 with a maximum of 700 men employed. As many as four squadrons totalling 100 aircraft, used this field at one time, and it undoubtedly played an important part in the defeat of the enemy.

Torrens Creek.

The construction of a heavy bomber field between Hughenden and Charters Towers was called for and a suitable site was selected at Torrens Creek where the work of construction began in March, 1942. Three runways were constructed with the required length and width, and all other requisites for the use of heavy aircraft and personnel were provided at an approximate cost of £70,939. The original scheme included the construction of dispersal strips at two points within a few miles of Torrens Creek, but these were not proceeded with, dispersal strips at Prairie and Warreah being constructed in lieu.

Camooweal.

At Camooweal the existing aerodrome was reconstructed and extended. The two original runways of antbed were found to require resheeting and the length of both was practically doubled. One new runway was constructed and bitumen emulsion manufactured on the job was used for surfacing and hardstanding, and access roads were also provided. The drome is situated at the top of a slight rise and hundreds of large stones up to nearly 2 tons weight had to be removed.

During the preliminary stages it was proposed that the existing fences to the drome should be removed in order to provide a better approach. Permission for this, however, was refused on the ground that it would allow stock to stray on to the field. However, a plane in taking off carried away a fence post and two wires, whereupon an order to remove the fence was promptly received. Up to 170 men were employed and the approximate value was £48,809.

In this district a staging camp was also constructed, the work comprising the grading, gravelling, and drainage of carparks and roadways. Approximate cost, £398.

Mount Isa.

The Mount Isa aerodrome was extended, the job consisting of clearing, fencing, grading runways, and erecting markers. The chief difficulty encountered was in connection with the fencing, as, owing to an acute shortage of wire for non-priority jobs, the aerodrome fence disappeared at intervals and had to be replaced. On preliminary work done by Albanian labour the cost of round fence posts reached 20s. per post cut. The services of the Albanians were then terminated by the Civil Alien Corps. Three new runways each 150 feet wide were constructed later, and the fencing made goat-proof. A deviation of the Mount Isa-Duchess road was also effected.

Brunette Downs.

The lengthening and strengthening of the runway at Brunette Downs was treated as a rush job in order to make this small civil drome usable for military aircraft. The construction gang, which reached a maximum of 84 men, was transferred from Mount Isa-Tennant Creek road. This involved a journey of 140 miles each way over blacksoil plains, the return trip being made during the wet season. Cost estimated at £3,975.

Barcaldine.

At Barcaldine, 1 mile east of the township, a strip of 4,000 feet by 500 feet was cleared by a detachment of U.S.A. engineers using coloured labour. The strip was pegged for a further 4,000 feet and left unfinished. The Main Roads Commission completed the formation and gravelling, erected Army reserve storage and an oil depot.

Cloncurry.

Following upon suggestions made by the Department of Civil Aviation for improvements to the civil aerodrome at Cloncurry, surveys were made early in 1941 with a view to extending the area of the field on the western side and to divert an existing road from the western side. Tests were also made of available gravels and soils in order to secure suitable material. In June, 1941, plant and men necessary for the construction of a major airfield to meet both R.A.A.F. and U.S.A. requirements were assembled.

Contracts for strengthening and extending existing gravel runways and taxiways to accommodate heavy bomber and freight planes, and for the construction of hospitals, workshops, &c., were let direct to contractors by the Allied

Works Council, and the Commissioner supplimented these activities with day-labour work, finally taking over all activities at Cloncurry aerodrome and completing bitumen surfacing of all runways, taxiways, hardstandings, &c.

Balfes Creek.

At Balfes Creek, near Charters Towers, landing strips, taxiways, &c., were laid down to accommodate a heavy dive bomber squadron at an estimated cost of £51,824, with a dispersal strip at Tarangie costing £1,417.

Normanton.

The task of effecting improvements to the aerodrome at Normanton was placed with the Main Roads Commission in July, 1943. The plan provided for clearing and grubbing 86 acres, construction of two runways of 2,500 feet and 3,000 feet respectively, with a width of 150 feet, taxiways and apron, removal and re-erection of hangar, drainage and fencing. In November work was closed down owing to the approach of the wet season, difficulty of access, and heavy cost. A fresh start was made in July, 1944, and the work completed. Estimated cost, £46,709.

Inverleigh.

The construction of an aerodrome at Inverleigh, 30 miles south from Normanton, was authorised in December, 1942, and the work commenced in the following month. This comprised a landing strip, 7,000 feet by 400 feet with the usual appurtenances besides camp buildings and accommodation for officers and men of the R.A.A.F. Some material for this job was carried by air from Cloncurry, 300 miles distant. A second runway was provided later, both strips being gravelled and the ends sealed. Some grading and smoothing was also carried out on landing strips at Wondoola, Canobie, and Milgarra, stations between Inverleigh and Cloncurry.

Powlathunga.

An airstrip at Powlathunga had been cleared and smoothed at a cost of £1,500, and was in use in July, 1942, as a dispersal strip for Balfes Creek aerodrome, when the work was held in abeyance and nothing more was done.

Laura.

An amount of £3,035 had been expended on preliminary work for an aerodrome at Laura when it was suspended, men and plant being transferred to more urgent jobs.

Carpentaria Downs.

Two flight strips 7,500 feet long and 400 feet wide connected by a straight taxiway of 6,000 feet were cleared at Carpentaria Downs, 36 miles from Einasleigh. Operational and camp buildings were erected on a ridge with excellent drainage and reasonable cover. A deviation of the main road had to be made. Crystal-clear and tasteless water was obtained from a well sunk in the bed of the Einasleigh River and pumped to tanks near the camp. Dispersal areas and other facilities were provided. Estimated value, £26,038, with 105 men employed. A road built at The Lynd was used as an approach to Carpentaria Downs, and the construction of a strip at The Lynd was not proceeded with.

Wrotham Park.

Construction of an aerodrome at Wrotham Park, 45 miles by road from Mungana, was planned in June, 1942, a site located and two landing strips each 7,000 feet long completed. The job was suspended in October, 1942, but some planes used the field at times of emergency.

Augustus Downs.

A decision reached early in 1942 to construct a landing strip at Augustus Downs, in the Gulf area, 200 miles from Cloncurry, was altered to provide a full operational base with accommodation for resident personnel of the R.A.A.F. This included two runways, each 200 feet in width, with gravelled taxiways and hardstanding, some bitumen surfacing, building 3½ miles of access road, with mess huts, water supply, and drainage. Final cost estimated at £41,418.

Prairie.

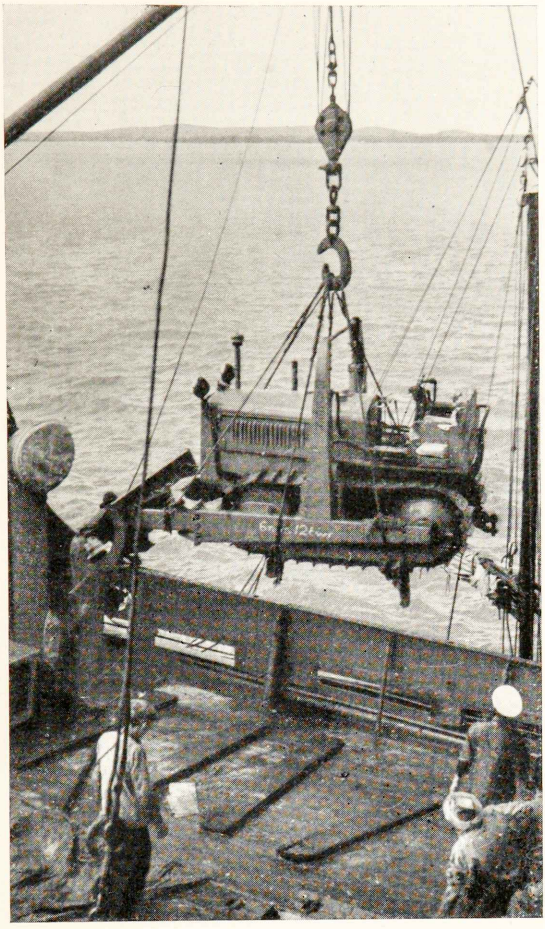
The construction of a heavy bomber field at Strathglass (Prairie) was abandoned after some work had been done at an estimated cost of £11,657. One strip was cleared, grubbed, and lightly formed, suitable for use in dry weather.

Coen.

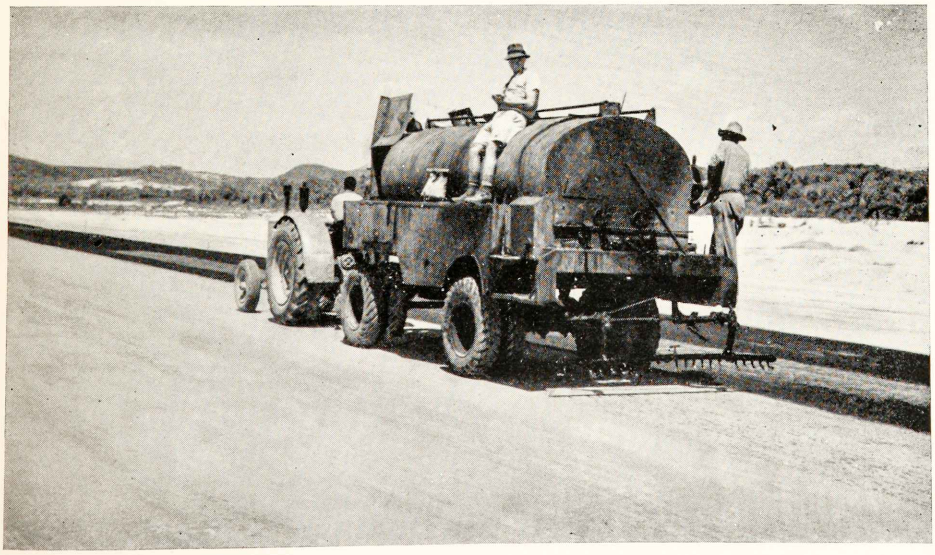
The provision of an R.A.A.F. advanced operational base on Cape York Peninsula became an urgent matter in 1941, and a site near the old goldmining centre of Coen was selected because of its geopraphic and strategic importance. The work presented many problems, however, by reason of its remote situation, what was described as the "spewey" nature of the country, and the fact that it was entirely cut off from the outside world in the wet season so far as surface traffic was concerned. Much of the plant required for construction was sent from Brisbane by sea to Flinders Island and thence by small craft across Princess Charlotte Bay to Port Stewart, with another 40 miles of road transport to Coen. Some plant from Horn Island was landed at Cooktown, taken from there by rail to Laura and on by road from the railhead to Coen. The construction of a road from Coen to the 'drome, 13 miles, cost £4,324. The area of the 'drome, 183 acres, was cleared and drained and sown with couch grass. Three runways were laid down, two large buildings erected, and a deviation of the overland telegraph line effected. Taxiways, dispersal points, workshop, bomb dump, and pyrotechnic stores were provided and the 'drome fenced to keep out the wild pigs which infest the district. This work was undertaken in the first instance by a unit of the P.E.I. Board of Lands Department, which later merged with the Main Roads Commission.

Cooktown.

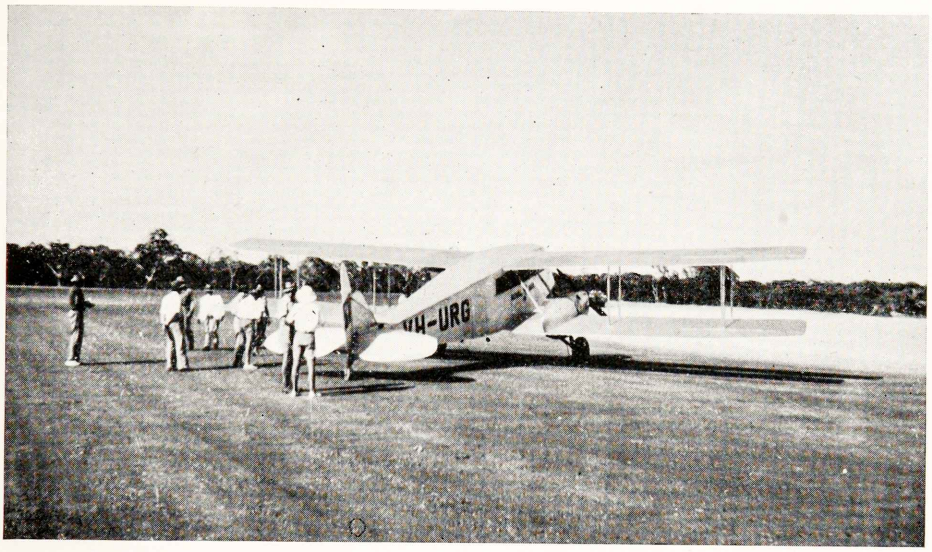
The task of developing an existing civil aerodrome at Cooktown to meet the needs of the R.A.A.F. as an advanced operational base was delegated to the Main Roads Commission early in 1942. The location was a mangrove mud flat encircled by a levee embankment to prevent flooding and tidal inundation. There were three runways, one of 3,000 feet in general use, one of 2,700 feet constructed for 1,800 feet only, and one of 2,400 feet constructed to 1,600 feet. All three were difficult of approach owing to



Transhipping equipment for the Horn Island Aerodrome.



Bitumen sealing No. 1 Runway on Horn Island, Torres Strait.



Horn Island Aerodrome in use.

the hilly country adjacent. Poor soil conditions restricted all aircraft movement to the runways. There was an absence of suitable dispersal areas, water supply was inadequate, and drainage was of doubtful efficiency, especially in the mangrove mud, where aircraft became bogged, sometimes resulting in considerable damage.

After some improvement had been effected, men and plant were transferred for the provision of an aerodrome at the Lutheran Church Mission, Endeavour River, where an airstrip was laid down, with the usual accessories of apron, dispersal areas, buildings, access roads, and an adequate water supply for the use of United States bombers and personnel. The Mission buildings, including the church and school, were used as men's quarters and stores. The Mission was reimbursed later.

A subsequent request was received by the Main Roads Commission from the Director of Civil Aviation for further work at the Cooktown aerodrome. This involved the completion and strengthening of the runways to full length, the construction of taxiways, dispersal points, splinterproof pens, hardstanding and apron, grading the approaches to the power house and meteorological station, building up the levee wall, and the provision of surface and subsoil drainage. A loading and refuelling area was also provided and a motor vehicle area cleared and paved. Transient flight and combat planes of both the R.A.A.F. and U.S.A. were thus enabled to use the 'drome in all weathers. To this end, however, a considerable amount of work had to be carried out from time to time in maintenance and reconditioning, owing to the nature of the site and heavy falls in the wet season. The approximate cost of all work at Cooktown, estimated in April, 1945, was £96,288. Because of its location the engineer on this job was heavily handicapped by lack of mechanical equipment. Some plant was carried 180 miles by road from Chillagoe.

Iron Range.

The construction of an advanced operational base for heavy bombers at Iron Range, some 25 miles inland from Portland Roads, was begun in June, 1942, by United States engineers and labour, but after five months it became necessary for them to transfer to other work, and the Main Roads Commission was requested to take over the Iron Range job. Described at that time by Brigadier-General Casey, Chief Engineer, U.S.A., for the Western Pacific, as second to no other in Australia in its importance, it was situated in thick rain-forest country, very difficult of access, with Chillagoe the nearest centre by road and Cairns the nearest by sea. For five months, December to April, of each year, the rainfall was heavier than anywhere else on Cape York Peninsula, and during the progress of the work 10 inches were registered in two days. The transport of the men, plant, and material to the site provided a major problem, convoys of trucks and lorries sent from Townsville, via Chillagoe, Mitchell River, Coen, and Batavia taking ten days to do the trip.

The work the Main Roads Commission was called upon to do included the construction of 6 miles of roadway through heavy jungle, the gravelling of 6 miles of the road from Portland Roads, the completion of a jetty at Portland Roads, the formation of a logging unit and the establishment of a small sawmill to cut timber for buildings, &c., the regrading, regravelling, and resealing of 50 per cent. of two flight strips and six taxiways, cross drainage, dispersal bays, bridges, culverts and tank construction, the erection of buildings, including radio range and communication centres. Water supply involved well sinking and laying 2½ miles of pipes. From one well water was pumped continuously without diminishing the supply even when the pumping rate reached 20,000 gallons per hour.

The importance of the work called for the employment of about 350 men, but the number was frequently cut by 50 per cent. owing to transport difficulties. To maintain supplies of fresh meat was another problem, and this was solved to some extent by providing a refrigeration plant and cold room. The 600-feet wide clearing of thick and fairly heavy timber in the area was effected by fastening a stout rope between two heavy tractors and pulling over all trees in strips. The fallen trees were bulldozed into windrows, left to dry, and then burnt. Construction was carried out on foundations varying from firm granite sand to soft, swampy country. When the Main Roads Commission took over, a certain amount of material had been placed, but after some search superior quality was found and used for all subsequent work. Some extraordinarily good results were obtained. The value of the work was approximated at £223,000.

Higgins Field, Red Island Point (Jacky Jacky).

Red Island Point, about 30 miles south of Horn Island and at the tip of Cape York, was selected as the site for an advanced operational base and heavy bomber field. A U.S.A. engineering corps cleared a landing strip of 10,000 feet by 300 feet with a gravelled runway of 7,000 feet by 100 feet. The job was abandoned incomplete on 26th December, 1942. In March, 1943, the Main Roads Commission was requested to convert this into a heavy bomber field, reconditioning, strengthening, and sealing the 7,000-feet runway, reconstruct the taxiways, grade and seal the fuelling area, bitumen surface hardstandings and runways, form 5 miles of roadway to a width of 30 feet and gravel 8 miles of road to a width of 10 feet. Other work included provision of 16 dispersal areas and 18 splinter-proof pens for heavy bombers, replace all log timber culverts with pipe culverts, provide storm water drainage, and extend the flight strip. Transport was a major problem, but arrangements were promptly made to send men, plant, and materials from Brisbane, Townsville, and Cairns, 72 men, with tools and camp equipment, being sent by air to carry out the preliminary work. With an abundance of timber in the locality a sawmill was established with excellent resuts. When completed the cost of the whole job was estimated at £148,443.

Dunk Island.

Situated on the north-east coast, a few miles from Cardwell, and made famous by E. J. Banfield in his books "My Tropic Isle" and "Confessions of a Beachcomber," Dunk Island was chosen by the R.A.A.F. for an advanced landing strip. Construction was originally allocated to the Cardwell Shire Council, but later it was transferred to the Main Roads Commission. A strip of 2,300 feet with a width of 100

feet, clearing, earthworks, and drainage cost £593, with further expenditure from time to time in maintenance and repairs due to heavy rains.

Horn Island.

An advanced operational base for the R.A.A.F. was provided at Horn Island in 1941, including the construction of a large aerodrome with two flight strips, each 4,200 feet long and 600 feet wide, with the centre strip metalled, access roads, taxiways, hideouts, and dummy roads, a jetty 600 feet long with steps and lifting plant, formation, metalling, and draining of 4 miles of road to connect the landing with the 'drome, a causeway for heavy plant, splinter-proof shelters, dispersal points, and runways. At the outset there were no landing facilities whatever, and it was necessary to land plant and material from Thursday Island on the beach as tides permitted. The material was conveyed from Thursday Island by punt and from the beach it was transported overland 4 miles to the drome. The first flight strip was nearing completion when a request was received to have No. 2 strip and taxiway also ready for aircraft within three months. Further modern equipment and plant were then received, most of it fitted with electric light. By dint of working 18 hours each day the first aircraft was able to land on No. 2 strip well within the three months. Gun emplacements, a bomb dump, ammunition storage, water supply tanks, a dam, several miles of open side and diversion drains, culverts, &c., were constructed; 730 feet of reinforced concrete piping cast in situ and laid, splinter-proof pens and slit trenches were provided against attack. The buildings and quarters were constructed of camouflaged asbestos-cement sheeting. Only a few local men were available for the job and of upwards of 90 employed when at full strength 70, including supervisors and specialists, were sent from Townsville and Cairns. Approximate cost of the work, £78,224. Extensions of runways, various improvements, reconstruction and reinforcing rendered necessary by heavy rains and general wear and tear covered a considerable period and brought the approximate expenditure to £123,194.

Groote Eylandt.

A flying-boat base and extensions to an aerodrome were constructed at Groote Eylandt. The 'drome comprised two flight strips, each 2,000 feet in length and 600 feet wide, with five dispersal strips, pens, and as many machine gun posts. A wireless receiving hut with splinter-proof transverse wall and petrol drum shelters were provided. Much of the labour on this island was provided by the natives through the agency of the Rev. L. J. Harris of the Church Missionary Society. For this the Church Missionary Society was paid the sum of £328 in addition to 72 pairs of shorts, 300 yards of calico, 50 lb. of tea, and 60 tomahawks supplied.

Satisfactory Inspection.—The following letters speak for themselves. From the office of the Chief Engineer, General Headquarters, South West Pacific Area, dated 5th September, 1942, to Mr. J. R. Kemp, Deputy Director-General, Allied Works Council, Department of Interior, Brisbane.

Dear Mr. Kemp,—You were recently requested to construct for all-weather use eleven landing strips at the following localities:—Mareeba, Antill Plains, Cooktown Mission, Reid River, Woodstock, and Breddan. These strips have been placed in operating condition in an excellent manner, and have been made available for use by the air units within the very short time limit specified. The small amount of work remaining to be done on these fields is rapidly being pushed to completion. Within the same period your organisation also constructed landing strips at Stock Route and Ross River. Additional work was also requested of you for completion of all-weather landing strips at twenty-two localities prior to the rainy season. In spite of the large amount of work involved, this entire programme has been launched in a surprisingly short time.

I wish to express my very great appreciation of the special efforts put forth by yourself and members of your organisation and the construction agencies concerned to attain these excellent results. The efforts of all those engaged upon these very important projects have materially aided the tactical units concerned in carrying out their missions against the enemy. It is requested that you express to all concerned my deep appreciation of the splendid work accomplished by them and the excellent manner in which the airfield programme in North Queensland has been and is being prosecuted. I trust that your organisation will continue to push the programme with the same forcefulness which has thus far been so well displayed.

Sincerely,

(Sgd.) HUGH J. CASEY,
Brig. General, U.S.A.,
Chief Engineer.

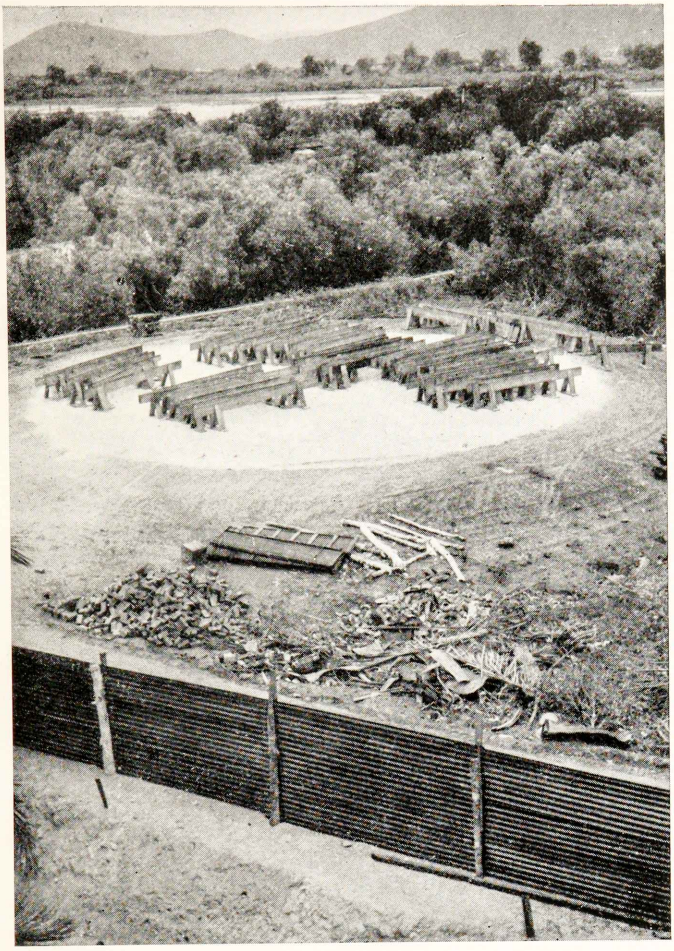
Also from the Office of the Chief Engineer, dated 14th August, 1942, to Mr. J. C. Mathison, District Engineer, Main Roads Commission, Northern District, Townsville:—

Dear Mr. Mathison—Inspection has recently been made of the Mareeba and Cooktown airfields. I was deeply impressed with the splendid work performed by the Main Roads Commission organisations on these two sites. The work has been well performed and in expeditious time. Both of these fields are important for our present and proposed operations.

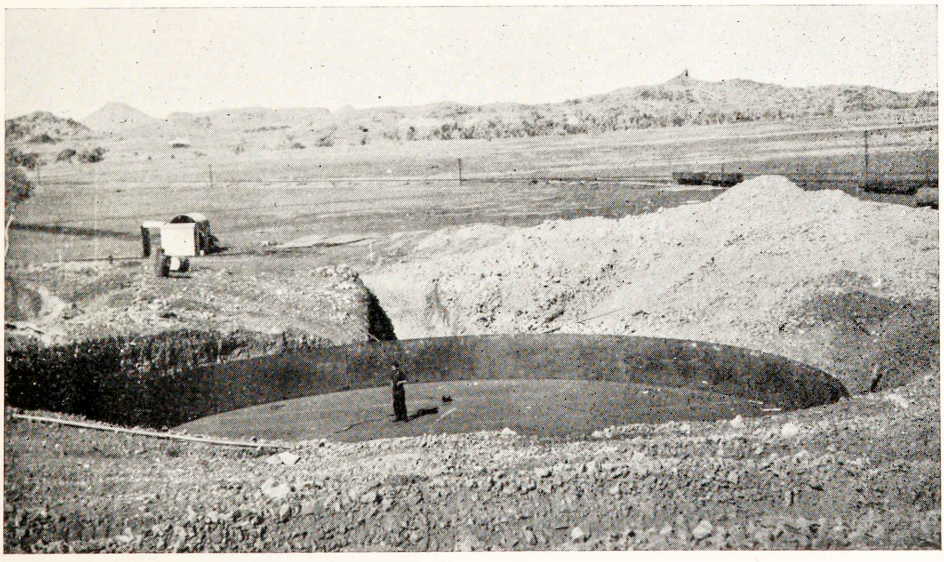
I should appreciate it if you would express to all members of the organisation or workers concerned with these projects my deep appreciation of the splendid work performed by them. I hope that you and your organisation will continue, on the remaining important projects still to be completed, to carry on the same excellent standards that are being demonstrated by the work on these two outstanding projects.

Sincerely,

(Sgd.) HUGH J. CASEY,
Brig. General, U.S.A.,
Chief Engineer.



Foundations for oil storage tanks placed in a North Queensland mangrove area.



Welded underground tank for the oil installation at Cloncurry.

CHAPTER 6.

OIL STORAGE AND MUNITIONS.

OIL STORAGE.

The Main Roads Commission was called upon from time to time to make provision for the storage of petrol and fuel oils in widely separated locations. The bulk of the work was done in the years 1942-3 and usually with the use of two or three shifts because of the need for early completion. The most important of these tasks were at Brisbane, Townsville, and Cairns.

Brisbane.

Three reinforced concrete tanks for the storage of black oil were constructed on the Shell Company's property at Campbell street, Bowen Hills. Two of these tanks had each a capacity of one million gallons and the third a capacity of one and a quarter million gallons. The approximate cost with related jobs totalled £52,286.

In connection with berthing facilities for warships on the south side of the Brisbane River two Naval oil fuel tanks, each of 25,000 tons capacity, were built at Cannon Hill at an estimated cost of £28,303 and three bulk seaborne petrol storage tanks, each to contain one million gallons, were provided at Colmslie, estimated cost £48,961. Protective walls were built around oil fuel tanks at Windsor road, excavation work for installing two 12,000 gallon tanks at Strathpine and two 1,000 gallon tanks at Lawnton was also carried out. Gravelled approaches, drainage, &c., were provided in each case.

The excavation of site and construction work for two steel Navy fuel tanks at Gibson Island with splinter proofing, road formation and paving of camp road, fencing, &c., was carried out at an approximate cost of £12,150.

Inland Fuel Depots.

The Main Roads Commission excavated sites, prepared foundations, carried out concrete work, drainage, fencing, &c., in connection with the provision of R.A.A.F. fuel storage tanks and facilities for the storage of drums of T.E.L. spirit at Yarraman, Toowoomba, Roma, Gayndah, and Charters Towers.

Charleville.

Three petrol storage tanks each of 25,000 gallons capacity were built at Charleville for the United States Air Force, the Main Roads Commission carrying out all work incidental thereto.

Roma.

Sites for an inland fuel storage depot were surveyed by the Main Roads Commission at Roma, the land selected and the approaches cleared, foundations and all concrete work for five tanks carried out, access and interior roads and paths laid down, also excavation for tunnels and pump house with foundations. A bore to supply water was put down by the Department of Irrigation and a railway siding provided by the Railway Department. Approximate cost £10,021 and maximum of men employed 55.

Charters Towers.

Sites were prepared by the Main Roads Commission for three aviation spirit storage tanks, each of 4,000,000 gallons capacity, also the construction of boundary fencing, roadways and paths, extension of water supply and drainage cost approximately £3,249. A 3,000 gallon water tank on stand was also erected at the power house.

Gladstone.

Coney Island, Gladstone, was chosen as a site for three seaborne petrol storage tanks, each with 1,000,000 gallons capacity. The Main Roads Commission cleared the site, carried out the excavation, constructed the reinforced concrete walls and timber roofs, formed the compound embankment and walls on the northern, western, and southern boundaries, excavated a trench for pipe lines to the Gladstone Jetty, and provided the piles for portion of the route submerged at low tide. Shift work was necessary owing to the urgent nature of the job. The estimated total cost was £46,000. Maximum number of men employed 65.

Bundaberg.

At the R.A.A.F. Station, Bundaberg, the Main Roads Commission cleared an area outside the landing ground for the storage of aviation spirit drums. This compound was gravelled and an access road constructed.

Mackay.

Foundations were excavated and concrete floor laid by the Commission for a distillate fuel tank of 5,000 gallons capacity for the Navy at Mackay.

Townsville.

In June, 1943, the Main Roads Commission was authorised to proceed with the preparation of sites at Townsville for three aviation spirit tanks with a total capacity of 1,500,000 gallons to be ready by the end of November, all for the Air Corps, also one motor spirit tank of 500,000 gallons for the Army. These jobs were duly carried out to time.

At Magazine Island (Townsville) the Main Roads Commission excavated and prepared foundations for a 500,000 gallon distillate oil tank and supplied all spalls and gravel.

One 1,000 gallon emergency fuel tank was installed for No. 3 Fighter Sector at Stuart, others of similar capacity at Cape Cleveland, Sydney street, Belgian Gardens, Townsville

Grammar School, and excavations were made for bulk fuel storage at Victoria Foundry.

Work at Mount St. John anti-aircraft station included construction and drainage of oil and shell stores, water supply to kitchen and ablutions covering and screening magazine doors, and camouflage of road.

Mareeba.

A 25,000 gallon petrol tank was installed by the Main Roads Commission at Mareeba Railway Station as a reservoir for the aerodrome and to allow of railway tank wagons being unloaded quickly.

Cairns.

The Main Roads Commission excavated sites and laid foundations for a motor spirit tank to contain 500,000 gallons for the Australian Army, also two tanks, each to contain 500,000 gallons aviation spirit for the Air Force at Cairns.

Sand bases were prepared at Kenny street, Cairns, for five seaborne fuel tanks, each of 30 feet diameter, a bund wall was constructed, 1,400 feet of trench cut between the site of the tanks and Dulton street and a double pipe line was constructed to connect the two points.

Two reinforced concrete naval oil tanks were built at Edge Hill and 18,000 feet of 12 inch piping laid from the tanks to the wharf at Cairns with access roads to berth for three tankers.

Additional storage for lubricating oils was provided at the Cairns Army Reserve stores and a 5,000 gallon petrol tank removed to a new site.

Cloncurry.

Sites for four aircraft fuel storage tanks were excavated at Cloncurry, concrete foundations laid, the area cleared of spinifex, access and interior roads built, water supply extended, reticulation, drainage and fencing work carried out, at an approximate cost of £13,484.

Advanced Bases.

Two 10,000 gallon petrol tanks were placed at Grassy Hill, Cooktown, by the Commission.

One petrol tank of 12,000 gallons and another of 2,000 gallons with bowser were erected at Jacky Jacky, with access roads in each case.

At Thursday Island two concrete fuel oil tanks, each of 25,000 tons capacity, were constructed for the Australian Navy.

MUNITIONS.

In April, 1941, Mr. J. R. Kemp accepted an invitation to become a member of the Board of Area Management for the Ministry of Munitions and later was appointed Chairman of that Board. He was thus enabled to render considerable assistance to munition production in Queensland. In June, 1941, the Mechanical Engineer and several of the Main Roads Commission civil engineering staff were seconded to this work for the duration of the war.

Rocklea.

A most extensive job was undertaken by the Commission in the preparation of a forest-covered area selected as a site for munition works at Rocklea. This had to be cleared, the Rocky Water Holes Creek diverted, and formation work carried out for a 3 feet 6 inch railway from the main line at Rocklea to the works (about ¾ mile). Large tractors with 6-yard scoops were used in excavating 207,000 cubic yards of earth, with filling up to 18 feet, which were consolidated and rolled at a rate of 5,000 to 6,000 yards per day. Foundations were laid for extensive factory buildings, including a site for a small arms factory covering 4 acres. The site for another factory covered 6 acres. The site for a third factory involved the placement of 500 cubic yards of concrete, 1½ mile of surfaced roadway, and ¾ mile of footpath. Special concrete and asphalt had to be prepared for the cordite section. In liaison with the Brisbane City Council an electric tramway was built to the site. The cost of the whole job was estimated at £171,968. The factory commenced operations on a large scale a little more than 12 months after the work of preparation had started.

Helidon.

Ammunition stores were provided at No. 2 Replenishing Centre, Helidon, where the buildings were set back into sloping ground. Paths to stores, also internal roads, were made of unsealed gravel, a road to Russell siding made and drained, store floor treated with gravel composition, fences erected and facilities provided for the transfer of loading from railway trucks to motor trucks. Storage for provisions, records, and a magazine was built. Approximate cost £11,280.

Calvert.

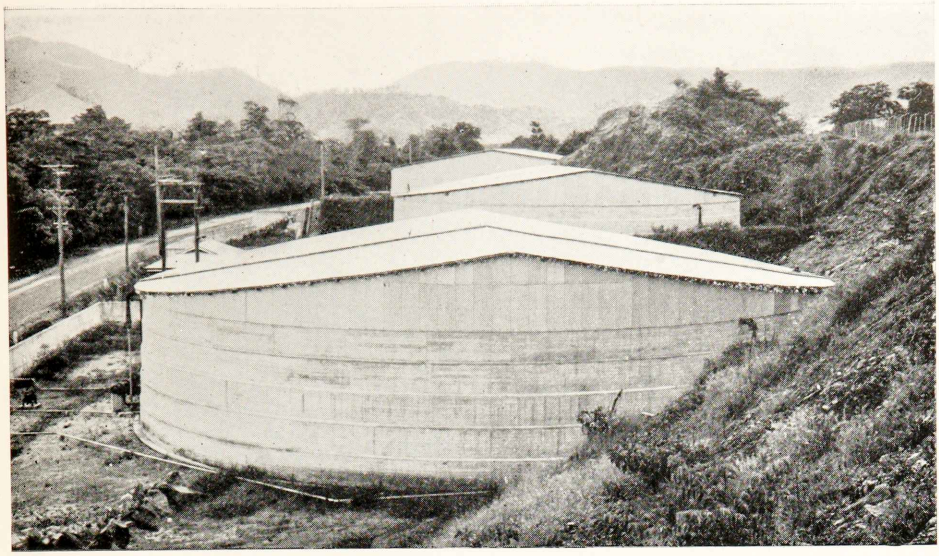
The provision of an ammunition depot at Calvert, in the Ipswich district, for the United States Army involved construction by Main Roads Commission of 9 miles of main road, width 18 feet, 9 miles of side road, width 16 feet. Clearing, grubbing, &c., was carried out in the preparation of a motor park and tent area. There were 120 aliens among the men employed on this job for which the requisition amounted to £206,960.

Wallangarra.

The 1st Australian Ammunition Depot was constructed at Wallangarra, where the work continued from January, 1942, to March, 1944. This included the construction of certain buildings in one depot area on the New South Wales side of the border. This was carried out in conjunction with the Tenterfield Shire Council. To speed the provision of housing space for ammunition arriving five semi-underground shelters were constructed. Later 10 timber structures and 70 Sydney Williams huts were erected in addition to buildings constructed by contractors. The whole area was fenced. Roads within the area and a bitumen-sealed road from the area to the special two-gauge railway siding were built also. The falling of timber was avoided wherever possible in order to leave cover from aerial observation.

Cordite Storage, Bundamba.

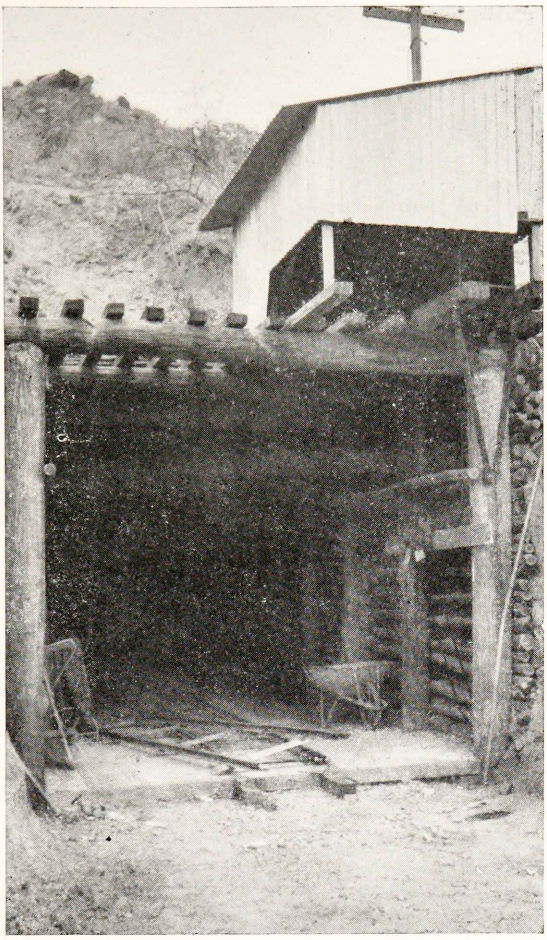
A disused mine tunnel at Ebbw Vale, Bundamba, was renovated for the storage of cordite and caps, with access road formation. The approximate cost was £428.



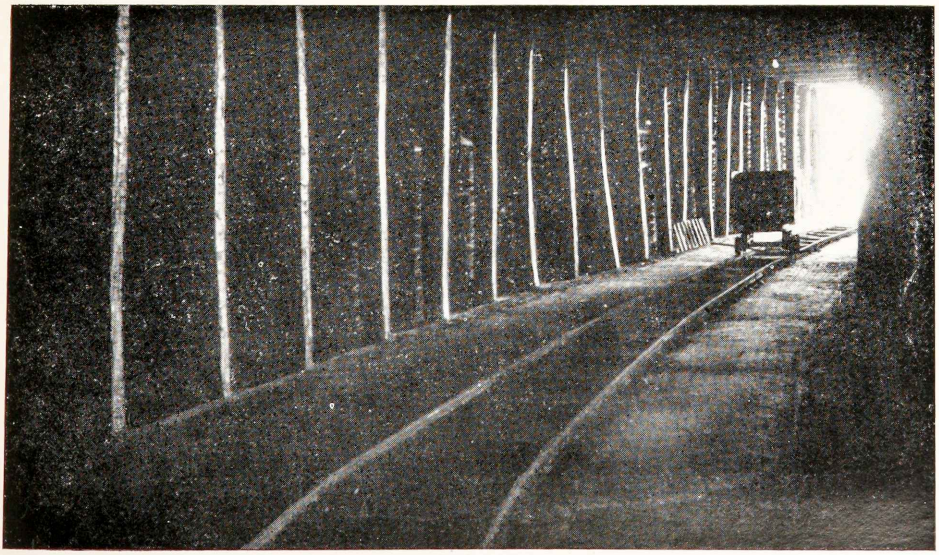
Cairns City—Reinforced concrete oil storage tanks at Edge Hill, Cairns, constructed for Allied Works Council.

A North Queensland Oil Storage Depot.

The M.R.C. begins operations on the site for the Rocklea Munitions Works.



Entrance to tunnel, Charters Towers Ammunition Stores.



Converted mine drive used as underground stores at Charters Towers.

Transport Depot, Stafford.

The preparation of sites for munition stores and transport depot at Stafford, together with roads and drainage, was carried out at an approximate cost of £4,268.

Ordnance Stores.

The 3rd Australian Ordnance Stores were also provided at Wallangarra. Here the Commission carried out a variety of work on behalf of the Army, and worked in co-operation with the Queensland Railway Department in providing railway access for both Queensland and New South Wales gauges. The operations of the Commission comprised in the main the construction of all road access within the area, preparation of building sites, and the carrying out of earthworks, formation, and ballasting for railway lines of both gauges leading to and within the stores area.

Building sites were very large, and the earthworks were extensive. On one site 14,000 cubic yards of earth moving was involved. In all, up to 200,000 cubic yards of earthworks were carried out in the preparation of sites. The great bulk of this was borrowed, and 20 trucks loaded by D8 and D7 tractors were employed. In the construction of rail access the widening of an existing cutting for a distance of 1,200 feet involved the removal of 40,000 cubic yards of earth and rock. Three compressors were used to drill the solid granite in this cutting.

To provide a temporary water supply pending the completion of the permanent project the construction of an earth dam was undertaken and 20,000 cubic yards of soil moved. The reservoir capacity was approximately 4¼ million gallons. Extensive crushing of concrete aggregate was undertaken and over the period of the job 18,000 cubic yards were produced from three crushers. This aggregate was supplied to all jobs, including contractors. In the tank park area sites for a number of igloos were prepared and all drainage and access roads constructed.

A timber yard covering 10 acres of ground was cleared and fenced and 1,000,000 super. feet of sawn timber from mills in New South Wales were handled. This material was despatched to various defence projects in South Queensland. Camps and messing facilities for the bulk of the men employed by all authorities on the project were maintained by the Commission's organisation.

Kowguran.

At Kowguran, in the South-western district, an explosives storage depot was constructed. This involved making a 10-feet roadway and excavation into a hillside so that a reinforced concrete bomb storage building could be erected. A gravel road 16 feet in width was constructed to give access to the railway. The location of the road around the hill to provide the best positions for excavation was one of the main problems. With an estimated value of £22,723, the maximum of men employed was 59.

Columboola.

An ammunition dump was built at Columboola, 2 miles of gravel road 18 feet wide and 5¾ miles of 12 feet wide gravel access road constructed, also roads inside the area. Cost £13,441 and a maximum of 55 men employed.

Geebung.

Sites for extensive storage magazines were prepared at Geebung near Brisbane for the United States Army.

Munition Dumps.

Munition dumps for both the Australian and American Army authorities were prepared in many places throughout Queensland. In the majority of cases several miles of access and interior roads were provided.

CHAPTER 7.

FORTIFICATIONS AND NAVAL BASES.

Brisbane.

In the eighties of last century the public mind was disturbed by reports that Brisbane was in danger of attack by the naval forces of Czarist Russia. The construction of a fort at Lytton commanding the entrance to the Brisbane River and the purchase of two gunboats, the Paluma and Gayundah (aboriginal for Thunder and Lightning) was held sufficient to allay all anxiety. By 1942 however Tennyson's vision in which he

"Heard the heavens filled with shouting, saw a rain of ghastly dew,
From the nations' aerial navies, grappling in the central blue"

had become a grim supplement to dangers from the sea. In addition to the construction of the aerodromes and flight strips already described, it became necessary that fortified posts should be provided on vantage points extending along the whole of Queensland's seaboard and on the islands of Torres Strait, with anti-aircraft guns, searchlight platforms, engine rooms, signalling coast and inland, to guard against enemy approach by either sea or air. Here again the organisation of the Main Roads Commission proved of inestimable value and demands were made upon it for the completion of these works at a speed that would have been impossible otherwise.

In Brisbane, anti-aircraft gun emplacements, searchlight and signalling stations, both on the stations, and command posts were constructed at Victoria Park, Colmslie, Hemmant, Balmoral, Hendra Park, Fort Lytton, Mount Gravatt, Archerfield, Amberley, and on the islands of Moreton Bay.

Seaward Defences.

For the seaward defence of Moreton Bay the Main Roads Commission was called upon to construct fortifications and naval installations in key positions on Moreton and Bribie Islands with trafficable roads between the several points for the transport of material and stores. A fort had been built at Moreton Island some time before the war. This was subsequently strengthened and extended and was known as Fort Rous.

Early in 1942 the Main Roads Commission was directed to erect buildings, anti-aircraft gun emplacements, command and battery observation posts, underground plotting room, magazines, accommodation for officers and men, a 20,000 gallon tank of concrete, and a 20-bed hospital at Cowan-Cowan (aboriginal Kau-in Kau-in), also a controlled mines station with accommodation for officers and men of the Australian Navy.

All material for this work, cement, steel reinforcements. timber for the construction of a jetty, camp equipment stores, and personnel were carried from Brisbane by the m.v. Mirimar and the s.s. Lady Norman.

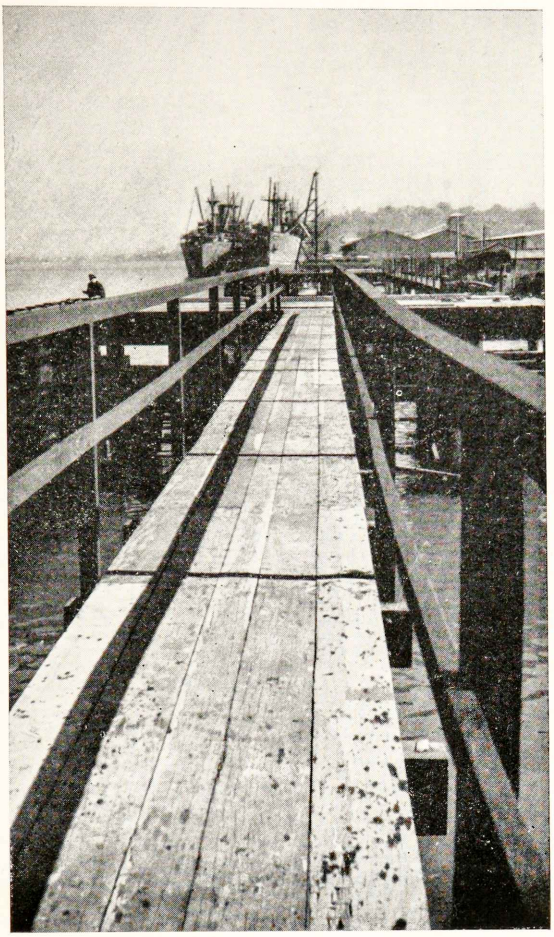
These vessels had to lay off in the open sea and unload into small punts which landed the cargo on the beach when the tide was suitable, a procedure which involved obvious risks. From this point some miles of road through very difficult country was partly built by men of the garrison to connect with Fort Rous and this was completed by the Main Roads Commission. The road was given a light pavement of concrete for which some gravel was landed on the beach and man-handled to the job. The cost proved to be quite prohibitive, however, and after investigation it was found possible to secure a mixture of dune sand and cement that suited the purpose. It was so satisfactory indeed that it was used with success in constructing the 20,000 gallon concrete tank.

A naval station was provided at Tangalooma, where another jetty was constructed and a road formed across the island to the ocean beach, where base end stations were established for beach patrols from a garrison located at Cape Moreton. A further naval base was provided at Comboyuro Point and 8 miles of road made passable from Bulwer to the Cape.

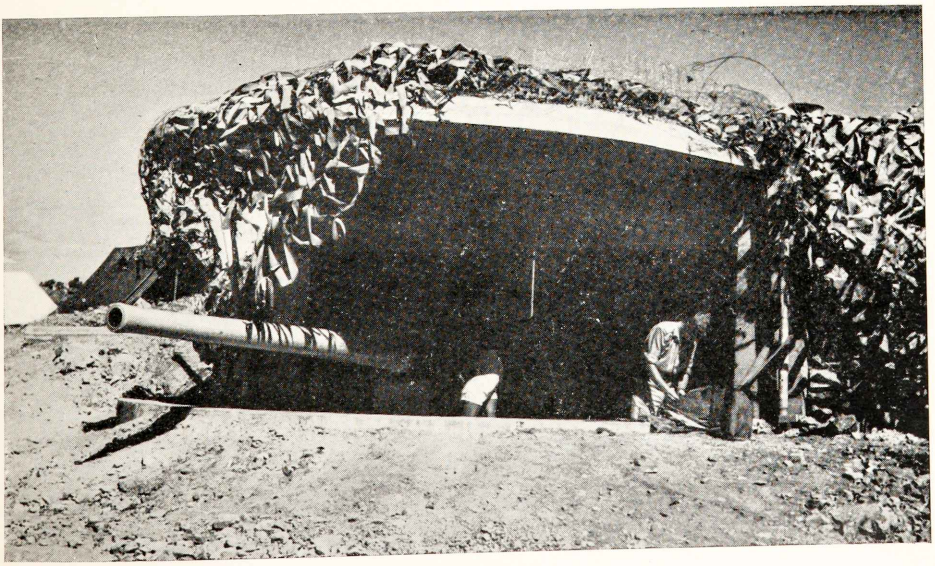
Communication between stations was confined almost entirely to the beaches at low tide. This at times involved considerable risk and on one occasion a garrison officer who was endeavouring to get a truck out of a soft patch of sand was fatally injured. The remains of an old pilot station with some neglected graves were found near Cowan Cowan, whilst wild goats, wild pigs, and some brumbies which roam in different parts of the island may be accepted as evidence of early civil occupation, after the passing of the aboriginal inhabitants, the Nooghies and Noonuckle tribes. At one stage 70 men were employed and the approximate cost of the work ran to £15,400.

In addition to the pre-war installations at Fort Bribie, where an underground wireless room was built by the Main Roads Commission, Skirmish Point, Bribie Island, was chosen as the site for a coastal defence battery, which was erected close to the spot where Matthew Flinders had a brush with the natives in 1799 and, for the first time of which there is any record, a Queensland aboriginal fell before the gun of a white man. Of great importance too was the provision of a Royal Australian Naval Centre on the eastern side of Skirmish Point, where some seaside cottages were taken over. The Main Roads Commission there built an Operations and Control Centre which involved the use of 35 tons of cement, approximate cost £2,778, also a power hut of concrete, approximate cost £2,778.

Buildings of timber and fibrolite were provided for officers and ratings, with recreation hut. stores. magazines for small arms, detonators



A Catwalk constructed at a North Queensland port.



Mounting a coastal gun for Seaward Defence.

and depth charges, a well, and eight chains of fencing. A prefabricated hut was placed outside the main camp with kitchen, laundry, and water supply, for the accommodation of No. 1 Signallers Corps A.W.A.S.

A great deal of work was done also at Woorim, Bribie Island, where, besides the erection of gun emplacements, provision was made for an elevated command post, plotting room, reserve magazine, water supply, two elevated base end posts, and road access. A ration store with mess accommodation for 20 men was built at Bribie Jetty, also a dolphin of 60 feet turpentine piles to accommodate ships too large for the jetty.

Toorbul Point.

For naval works and an amphibious training centre at Toorbul Point, the Main Roads Commission constructed a debarkation stage and catwalk, a slipway, gantry and hatchway of 10 tons capacity to lift boats to twin log skidway, strenghtening and repairs to existing vehicle and personnel jetties, the construction of an additional vehicle loading jetty, a jetty to represent a mock ship, a wharf for the discharge of fuel to tanks, with a pump house building, boat pound, four naval accommodation buildings, supply and installation of mooring piles, drainage of camp area, and the construction of two signal towers. The road between Caboolture and Toorbul (20 miles) was also brought up to military requirements.

Heavy Gun Shields.

The work at all points mentioned was carried out by the Main Roads Commission. In this connection it should be mentioned that shields designed by the Main Roads Commissioner, Mr. J. R. Kemp, were made by the Main Roads Commission and installed over all 6 inch and 4.7 inch guns at operational stations and fortified posts wherever located throughout Queensland and the Torres Strait Islands. These shields were of reinforced concrete with the addition of a steel curtain in front and a covered way from the rear walls. Commanding officers everywhere found that the provision of these shields materially increased the morale of the gun crews.

Mr. L. G. Neilson, Project Manager, Commonwealth Department of Munitions, addressing the Main Roads Commissioner under date 6th March, 1942, wrote:—

> *I feel that the performance you have put up in completing the major portion of urgent and essential gun shields in record time should be appreciated, and I wish to place on record my personal thanks and congratulations.*

In addition to the gun shields the Main Roads Commission also constructed a special type of mine spotting cover with adequate protection for men engaged watching for the appearance of floating mines, and these were placed wherever needed along the whole coastline. Depth charge throwers were made by the Main Roads Commission and placed at a number of coastal defence stations.

Rockhampton.

Machine gun emplacements were constructed at the Rockhampton aerodrome, the job comprising excavation of sites, timber work, iron work (including gun mountings), and placing concrete slabs.

Townsville.

The Main Roads Commission was called upon to carry out a great deal of work in connection with the fortification of Townsville in addition to aerodrome construction, the extension of a Naval slipway, Navy workshops, and base repair facilities.

At Fort Kissing Point permanent foundations and engine rooms for two searchlights were built, also 4.7inch gun emplacements with shell and cartridge magazines, ammunition stores of reinforced concrete with steel-lined doors and window shutters, battery command post, anti-aircraft gun positions, and access roads.

Fortifications, command post, engine room, and searchlight emplacements were also constructed on Signal Hill. The site selected for the command post was on a pinnacle of rock on the crest of Castle Hill. This necessitated a long and heavy haul of material and men to the parking area at the top of Castle Hill. Thence the material had to be man-handled along a goat track to the site of the job. All concrete had to be mixed by hand and formwork and concrete placed in a very restricted area with a vertical drop on three sides.

Pallarenda Point was chosen as the site for a heavy artillery post in connection with the beach defences. The provision of fortress gun and anti-aircraft gun positions involved a good deal of excavation and formation. Emplacements were built for two searchlights with engine rooms. Provision was made for water supply, and access roads were built.

A heavy anti-aircraft gun station was constructed in the Strand and on the western breakwater, beside others at Pallaranda road, Mount St. John, Ross River, Aitkenvale, and Garbutt aerodrome.

Charters Towers.

Test butts and gunfiring platforms were built at Charters Towers and considerable progress made with excavations and other work connected with the construction of anti-aircraft emplacements when the work was stopped and new sites selected in the Townsville area.

Breddan.

At Breddan, near Charters Towers, test butts and emplacements were constructed, a pipe line was cleared, grubbed, and trenched and 2,366 feet of cement pipes laid to provide a water supply.

Mareeba.

Anti-aircraft gun emplacements, test butts, and searchlight bases were built at the Mareeba aerodrome.

Magnetic Island.

In 1943, Magnetic Island, Townsville's popular week-end and holiday resort, was converted into a major fortress with strong seaward defences. A fortified post was constructed at Nellie Bay with 1½ miles of approach road involving heavy earthwork. Sites were prepared and seven buildings erected, including administrative offices, mess and kitchen, accommodation for officers, sergeants, and men, quartermaster's store, artillery and oil stores, casualty room, workshop, tanks, showers,

ablutions, and latrines. The work also included placings for a battery of heavy coast artillery, anti-aircraft gun emplacements, searchlight bases, command post, magazine and shell storage. The command post was built to two stories and the Main Roads Commission was called upon for further work at a later stage when internal roads were built up and bitumen surfaced. A considerable amount of additional drainage work was also carried out.

Degaussing Station.

In January, 1943, a requisition was received for the provision of materials and labour for a Degaussing Range at Orpheus Island in the Palm group. The work included the construction of a 200-feet jetty 4 feet in width, with mooring facilities, the erection of an observation hut, generator station, laying a cable to the observation hut, driving piles 200 feet off shore and in 10 fathoms of water with buoys and beacons, erection of lookout posts and sentry box. Material was carried from Lucinda Point in barges and lighters drawn by launch to Orpheus Island. The work was completed in four months at an approximate cost of £7,954.

Cairns Slipway.

Naval slipways were constructed by the Main Roads Commission at several northern centres the most notable being at Cairns for the use of the United States Navy. This slip was built on the gently sloping bank of a mangrove creek of great width and considerable depth, the surrounding area consisting of mud flat covered with a tangle of mangroves which involved the removal of 70,000 cubic yards of mangrove mud, mostly by dredging. A study of methods employed on slipways built with the aid of divers disclosed that progress was invariably slow and the completion of this job was urgent. It was doubtful also whether divers could work over such extremely soft mud and in turbid waters, to which was added the fact that in any circumstances divers were practically unprocurable. The use of a specially constructed diving bell was accordingly decided upon. The difficulties that had to be overcome in constructing this cleverly designed piece of mechanism, the method of its use, and the work done in completing the slipway need not be entered upon. Let it suffice to add that the results were quite satisfactory and the slipway is still in operation under the direction of the Cairns Harbour Board. The diving bell was designed by a seconded officer of the Bridge Staff, Co-ordinator-General's Department, who also supervised the construction of the work.

Cairns Naval Base.

Work by the Main Roads Commission at Cairns included the preparation of a site for a naval base, also four storehouses for a United States storage depot, sites for coast artillery, and anti-aircraft gun emplacements, searchlight bases and engine rooms, command post, magazines, plotting room, also the construction of a jetty and a road to the gun sites, kitchen, mess huts, &c.

At False Cape another fortified post was constructed with fortress gun and anti-aircraft gun emplacements, excavations, ground levelling and road making in collaboration with the Mulgrave Shire Council.

Advanced Bases.

It had been recognised long before Japan came into the war that the islands lying to the immediate north of Australia provided potential operational bases for any enemy forces approaching from that quarter, and that they should therefore be utilised as a strong defence line.

With this in view, towards the end of 1940 the Department of the Army decided upon the construction of a system of fortifications to cover Thursday Island, Goode Island, Horn Island, Hammond Island, Prince of Wales Island, Entrance Island, and Groote Eylandt, in addition to 'dromes, observation posts, &c., at various points on Cape York Peninsula. The whole of this work, together with its many problems of securing manpower, administrative personnel, and the transport of plant and material, was left to the Main Roads Commission, the most essential stages to be completed in three months.

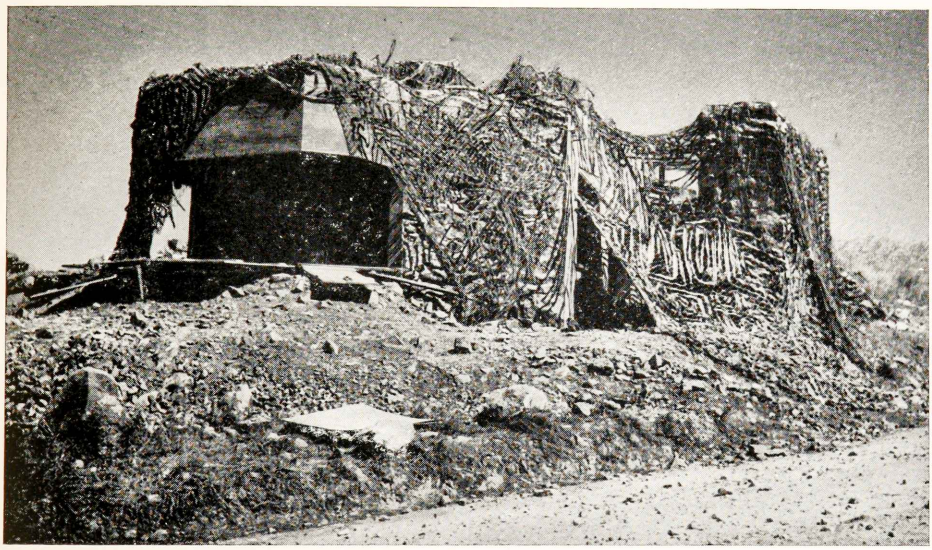
A difficult task was set at Portland Rocks, where at the outset a half mile of access road through rain forest had to be cut and cleared for the transport of material. Placements were built for two 60-pounder fortress guns and anti-aircraft guns, together with the fitting of gun shields. A command post, battery observation post, and buildings were included.

Iron Range, Jacky Jacky, Inverleigh, Coen, and Cooktown were included in the advanced posts at which the Main Roads Commission provided emplacements for fortress guns, machine guns, anti-aircraft guns, and searchlights with gun shields, plotting rooms, observation posts, magazines, camouflage, access roads, and accommodation for personnel.

Thursday Island.

Thursday Island was selected as a distributing centre for much of the material required, the bulk of which had to be transported from Brisbane by sea. The construction of battery positions, gun emplacements, observation posts, camp sites, buildings to accommodate a force of 210 men, hospital and sanitary accommodation, drainage, road and jetty construction, and the provision of an adequate water supply were undertaken at Thursday Island. At the outset it was found that the existing water sources were insufficient for the resident population of 1,700 souls during the dry months, and additions to the existing reservoir were promptly undertaken. Two 20,000 gallon tanks were erected on Millman Hill and 50 1,000 gallon tanks placed in the camps for the storage of roof water. This supply was augmented by the transport of water from Prince of Wales Island by steamer. A tank of 14,000 gallons capacity was also provided, into which sea water was pumped and reticulated therefrom for lavatory purposes. The need for material was so urgent that several existing buildings were taken over, demolished, and the spoil used for army purposes. Maintenance and other work continued for some time and included the provision of accommodation for naval personnel.

To provide the naval authorities with improved berthing facilities at Thursday Island, the Main Roads Commission strengthened the outer face of the jetty, widened the deck, renewed old timbers, and provided heavy breast mooring buoys.



A camouflaged searchlight auxiliary.

Sills were obtained from Cairns, but piles had to be shipped from Brisbane as the vessel running from Cairns could not carry piles of the required length.

Entrance Island.

At Entrance Island a stone causeway and jetty with a connecting road to the battery and accommodation for personnel were included in the job of providing anti-aircraft gun emplacements, searchlight bases, command post, and battery observation post.

Goode Island.

Goode Island was practically uninhabited when operations were begun, save for a lighthouse-keeper and his family, also one cottage used as a week-end and holiday residence. The island consisted of a granite residual, mainly a hump rising to 300 feet in height, lying north and south, with both extremes falling sharply to the sea. The western side was found to be precipitous, and on the east there was a wide re-entrant falling sharply from the crest, then easing to a flat to the beach. On this island were erected gun emplacements, a battery observation post, command post, searchlight emplacements and engine rooms, artillery store, reserve magazine, buildings for two camps to accommodate 240 and 170 men respectively, a hospital, and bakery. A new jetty was constructed and access roads provided. The work involved a considerable amount of heavy rock excavation, including the construction of four rectangular underground tanks each with a capacity of 20,000 gallons. One hundred galvanised iron tanks each 1,000 gallons and ten of 2,000 gallons were erected in the camps to conserve roof water. A sharkproof bathing enclosure was provided next to the jetty. The realignment of an old military road was included in the job.

CHAPTER 8.

THE BRISBANE GRAVING DOCK.

(Adapted from Brochure published by Premier's Department, 1946.)

The Brisbane Graving Dock is one of the largest in the Southern Hemisphere, and was built in record time during a period of unprecedented war strain.

The job started in August, 1942, and was tackled with such vigour and efficiency that within twenty-two months the dock was flooded and the first vessels were received.

This achievement was recorded, despite the fact that the large number of tractors, scoops, and bulldozers which had been assembled to undertake the initial work of excavation were removed for service in battle areas. Power shovels took the place of the tractors, scoops, and bulldozers, and throughout the period of excavation work was carried out for three shifts of twenty-four hours per day for six days per week.

Constructing Authority.

The Co-ordinator-General of Public Works was entrusted by the Queensland Government in August, 1942, with the construction of the dock. The project, being subsidised by the Commonwealth Government, consequently became an Allied Works Council project of high priority.

The Main Roads Commission and Department of Harbours and Marine were delegated as the chief constructional authorities. The Co-ordinator-General appointed a Board to continuously report and advise him and to consult with the Royal Australian Navy on matters of design, direction, and co-ordination. The Board consisted of:—

Chairman.

W. H. R. Nimmo, Chief Engineer, Stanley River Works Board, and member of the Co-ordinator-General's staff.

Members.

L. J. Price, Assistant Deputy Director-General of Allied Works, Queensland, and Chief Engineer, Brisbane City Council;

W. T. Evans, Engineer, Harbours and Marine Department;

C. M. Calder, Construction Engineer for the project;

D. Fison, Consulting Engineer, Department of Harbours and Marine;

G. W. Watson, Deputy Co-ordinator-General.

The Co-ordinator-General, who is also Chairman of the Stanley River Works Board, which is the constructing authority for the Somerset Dam, arranged for the utilisation of the Board's staff, under Mr. Nimmo's direction, to prepare the necessary plans and transfer skilled workmen and plant to the works. These workmen, together with others from State and City Council jobs, were subsequently enlisted in the Civil Constructional Corps of the Allied Works Council.

Some Details.

The dock can accommodate any vessel which is capable of negotiating the Brisbane River and accommodation can be provided with reasonable comfort for a single merchant vessel 800 feet long, 80 feet beam, with 32 feet draught. Alternatively, the equivalent of two ships, each 380 feet long, can be docked.

The length from the inner side of the inner sill to the head of the dock is 829 feet 6 inches at floor level, 830 feet at the level of the sills and blocks, and 835 feet 4 inches at coping level.

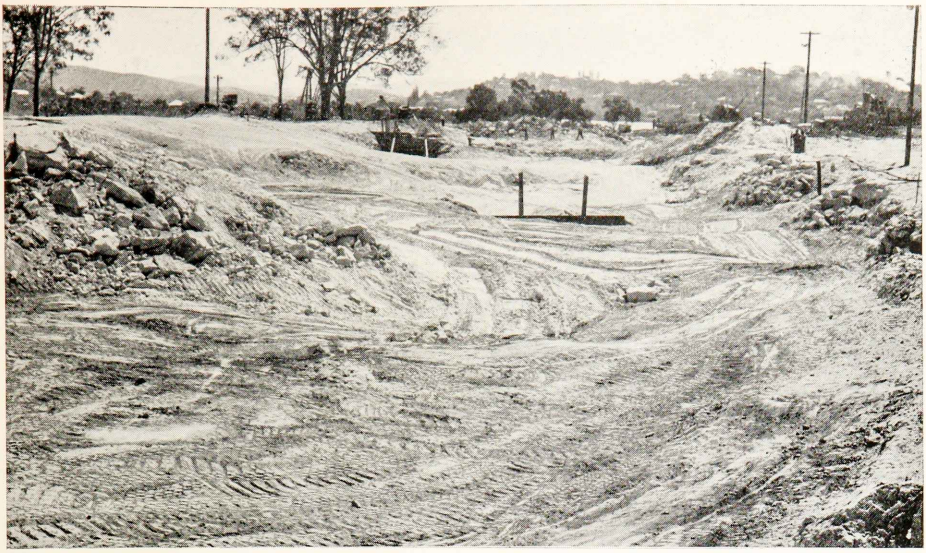
When in place, the caisson projects inwards from the inner side of the sill to a maximum of 16 feet 5 inches at a height of 26 feet 2 inches above the sill level. If measured from the outer sill, all the lengths given above will be longer by 50 feet.

The clear length between verticals from the fender on the caisson to the head of the dock at block level is 813 feet 7 inches with the caisson on the inner sill, or 863 feet 7 inches with the caisson on the outer sill. These dimensions control the maximum length of ship which can be docked, provided that the keel or structures at keel level do not extend so far aft beyond the blocks that the vessel would rest on the concrete of the sill structure.

The length at floor level from the sill structure to the head of the dock is 814 feet 6 inches. The floor of the dock at keel line is 34 feet below datum, and it slopes outwards at 1 in 100 to drains near the walls.

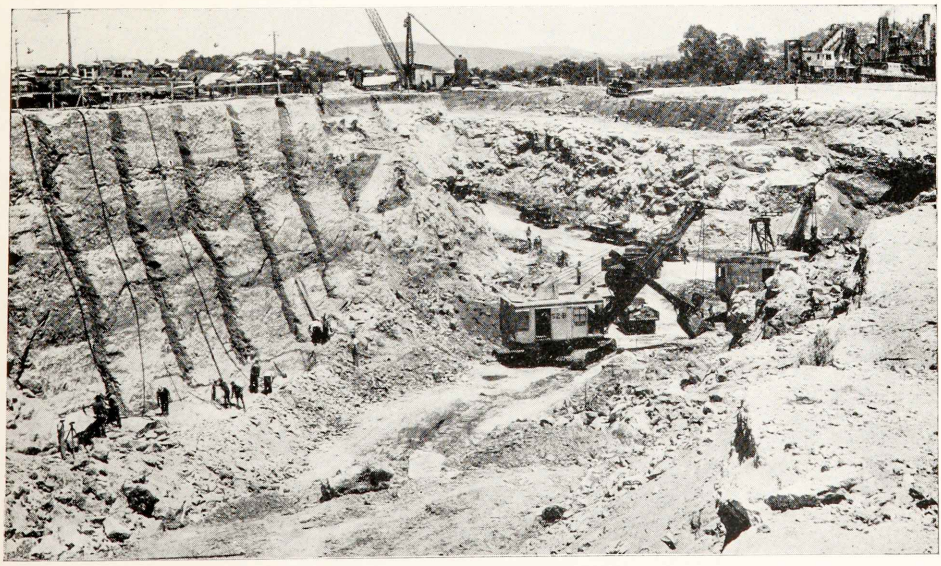
Four bilge altars, each approximately 1 foot in height, bring the level at the side walls to 30 feet below datum, this being the same as the level of the sills and the top of the keel blocks, and at this level the dock is 110 feet wide. Clearance between altars at any level is at least as great as the distance between the walls of the entrance structure at the same level. Width between copes is 121 feet 9 inches for approximately 90 feet at the entrance, and 127 feet 6 inches throughout the chamber.

There are two sills, both at 30 feet below low water datum—that is, the mean height of the lower low waters at springs. The height of tides at the dock is approximately that at the Brisbane River bar where mean spring rise is 6 feet 7 inches above datum; mean neap rise is 5 feet 3 inches above datum.

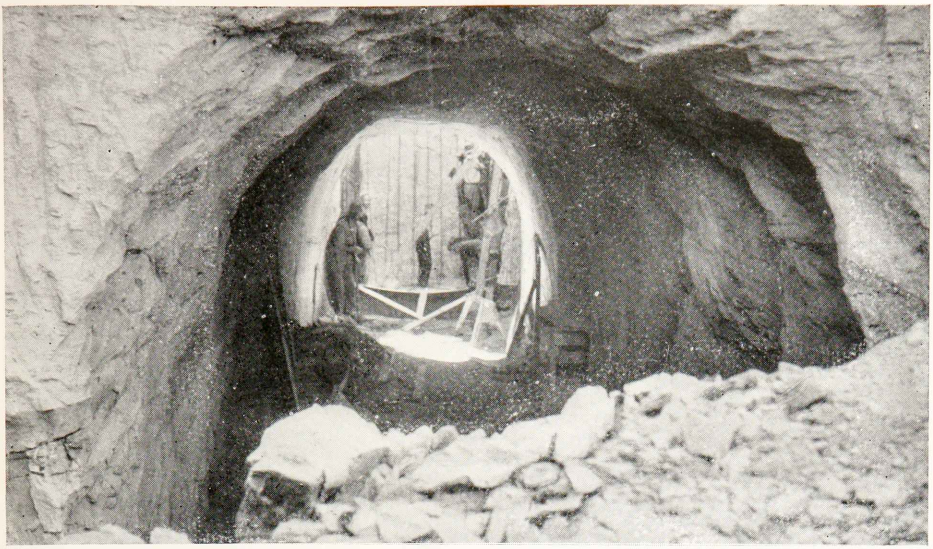


Excavation of dock, looking upstream. View taken from near downstream end of dock.

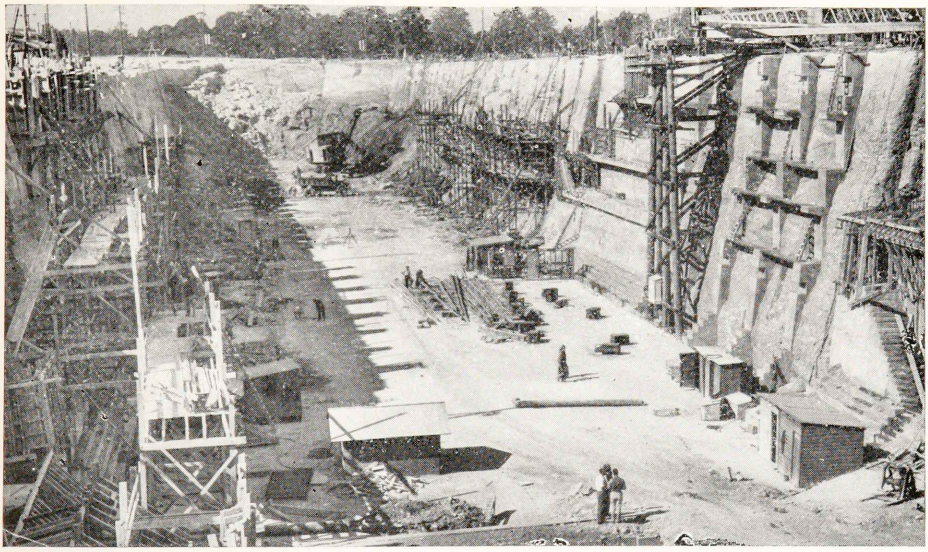
View showing progress of excavation. Top road being taken out. Note trucks entering at downstream end of dock to serve top face, while full width is taken on lower face.



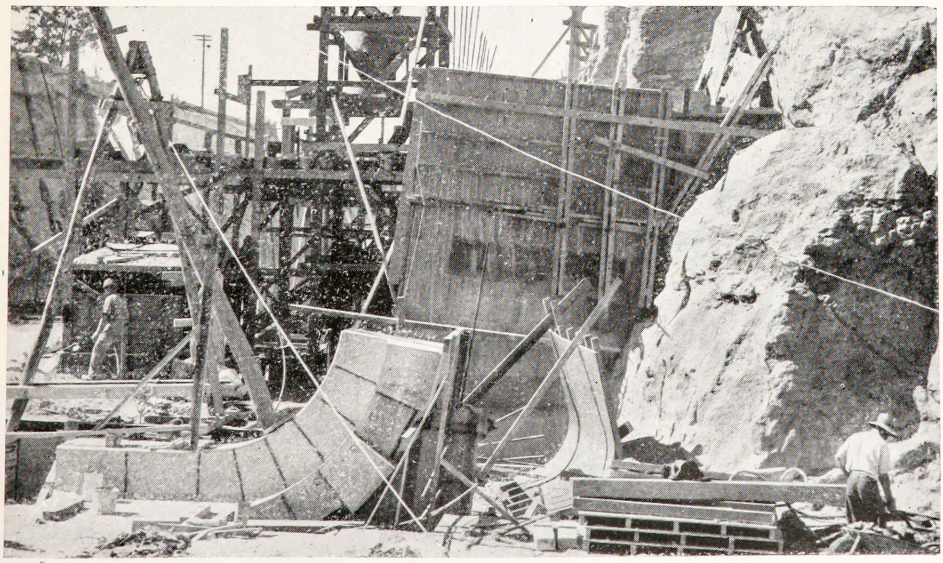
Work commences of cutting altar pieir recesses.



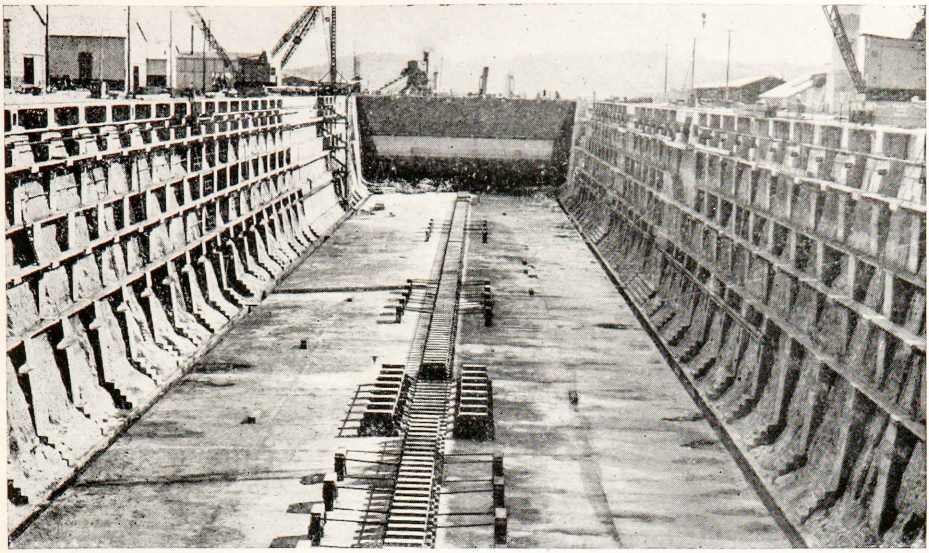
Tunnel for pump well.



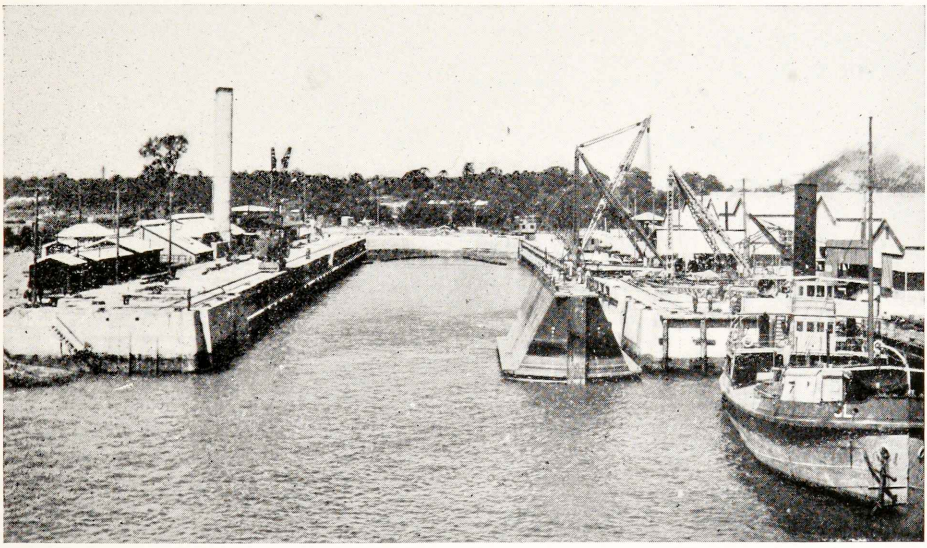
Another view of the general progress—June 1943. Crane for use in building caisson of dock shown on right.



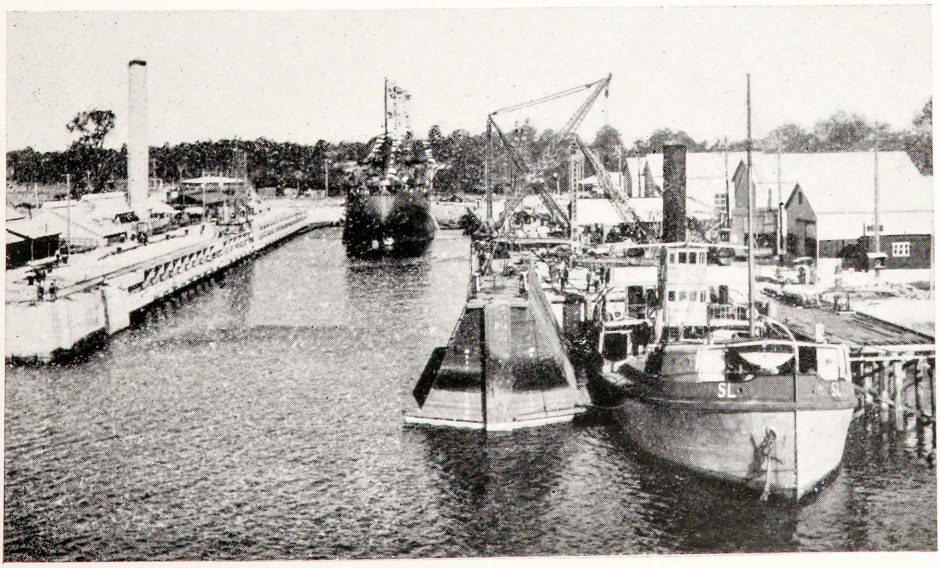
Placing granite blocks for outer sill.



Caisson in position. Blocks being placed for first docking.



The dock ready to take the two 10,000 tonners.



First ship docked.

The floor of the dock is 4 feet below the sills—that is, 34 feet below datum. The coping of the dock is 17 feet above datum. The four altars, two of which are cantilivered out from the walls, are respectively at 8 feet above, and 1 foot, 7 feet, and 16 feet below datum.

The outer emergency sill is an open or one-sided sill granite-lined. The inner or working sill is 50 feet from the other sill and is of the slotted type, which will permit of impounding water in the dock, but it is granite-lined on the inner side only.

Walls of the entrance structure, which contain the two sills, slope outwards from the centre line at 1 horizontal to 8 vertical. The line of the walls intersect that of the sill at 55 feet from the centre line, but walls and the floor level at the sills are joined by a curve of 5 feet 9 inches radius.

Walls of the dock are of natural sandstone and these have been cement gunited. The floor of the dock is of concrete, with a minimum depth of 2 feet. Underground drainage has been provided. The centre keel slab is 8 feet wide and 6 feet deep. The entrance structure supporting the granite-lined sills against which the ship-type caisson is seated is of concrete. Filling sluices, one on either side, are embodied in this entrance structure.

In the immediate vicinity of the emptying culvert and at a few other points the walls are of concrete, but elsewhere concrete piers 3 feet 6 inches wide have been built against the sandstone walls at intervals of 20 feet centre to centre. The face of these piers conforms to the shape of the altars formed on the concrete walls. The piers are connected by timber planks which thus provide a continuous gangway at the level of each of the four altars.

Pumping Equipment.

The emptying culvert runs under the floor at about one-third length of the dock and leads to a circular pump well 46 feet in diameter. Equipment in the pump well comprises one 30-inch centrifugal pump driven by a triple expansion steam engine supplied with steam by four boilers on the surface; two 15-inch electrically driven centrifugal pumps; and one electrically driven 6-inch drainage pump with automatic float control. Water is delivered directly to the river adjacent to the pump well. Forced ventilation is provided for the pump well. The combination of steam and electric pumps is due to wartime restrictions on plant, but has the advantage of providing alternate sources of power for pumping.

The main steam pump is the dredge pump from the old dredge "Hercules" driven by a triple expansion engine from the same dredge.

Of the four boilers, two are reconditioned boilers from the old "Australia" and two are from the dredge "Hercules." The four boilers were erected under the supervision of Messrs. Babcock and Wilcox, and the general direction of the Department of Harbours and Marine.

The volume of water contained in the dock at mean sea level—that is, 3 feet 6 inches above datum, without a ship in—is 24 million gallons with the caisson on the outer sill and 22.6 million gallons with the caisson on the inner sill. The estimated times required to unwater the dock are 6 hours 45 minutes and 6 hours 4 minutes respectively. At H.W. springs, the volume of water will be approximately 8 per cent. greater. With a 10,000-ton ship in dock, the times for emptying will be reduced to 5 hours 50 minutes and 5 hours 10 minutes respectively.

Operation of Caisson.

The dock is closed by a steel ship-type floating caisson equipped with electrically driven pumps. The caisson was constructed inside the dock by Evans, Deakin and Co. Ltd. When not in use, the caisson is berthed in a recess in the wharf, which is along the south side of the dredged approach channel to facilitate handling vessels coming into or out of dock. The caisson will be manoeuvred by small electric winches placed one on either side of the dock entrance.

The caisson is fitted with twelve 12-inch inlet valves for letting in water ballast and four 8-inch centrifugal pumps for removing water ballast when the caisson is in operation.

The dock is flooded when in operation by two sluice gates, one in each main sill wall, electrically operated.

Cranes, Machinery, Tools, Etc.

Cranes installed at the dock include two mobile cranes on either side having a capacity of 3 tons at 28 feet or 2 tons at 45 feet. There is also one 40-ton stiff-legged crane with a radius of 65 feet mounted on the south side of the dock near the entrance, with its mast of 60 feet, 69 feet 10½ inches from the centre of the dock.

Sufficient machinery and tools have been provided as part of the permanent dock equipment to enable repairs of a comparatively light nature to be carried out. It is intended that all heavy work will be carried out by engineering contractors.

Four electrical compressors, driven by 90-h.p. motors, provide a permanent supply of compressed air to the dock through a 4-inch compressed-air line laid along the side of the dock. A.C. and D.C. electricity are also provided to the dock site for connection to ships. The dock is equipped with salt-water services for fire-fighting or for washing down ships. The water for fire purposes is obtained from the high-pressure pump installed in the northern sill wall and the washing down water by a low-pressure pump, pumping into the same main and also situated in the northern wall of the sill structure. In addition, provision has been made for a supply of salt water through a 9-inch main for the circulating of water for ships while in dock. Adequate fresh water supply is available for ships in dock, also facilities such as a telephone and steam lines.

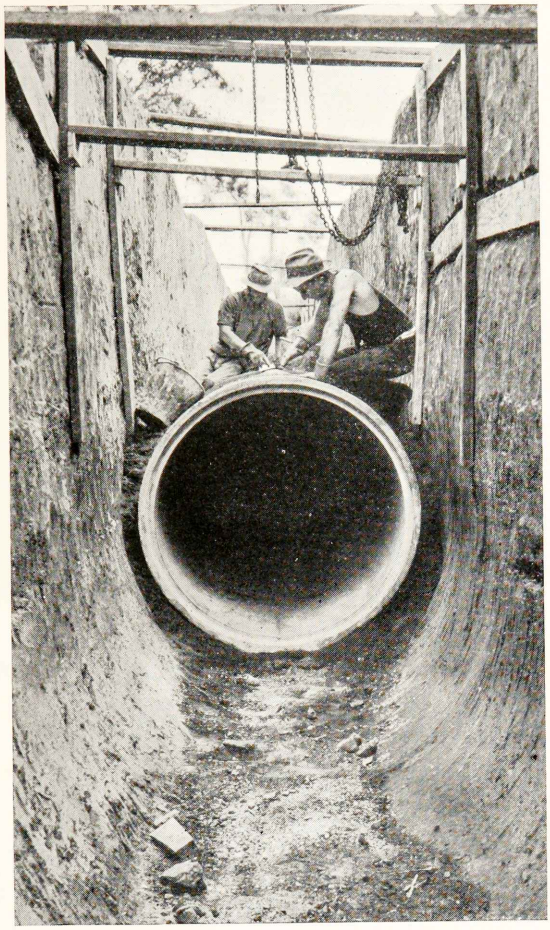
For convenience in handling ships a breast wharf has been constructed north of the dock entrance. This wharf is provided with electric power, compressed-air, and fresh-water facilities

to enable it to be used as a fitting-out wharf. A winch capable of handling vessels to and from the breast wharf has been installed. It is proposed to install pneumatic capstans. Permanent buildings erected at the dock comprise a store, workshop, blacksmith's shop, boiler shop, shipwright's shop, and substation buildings. In addition to the usual lavatory and dressing accommodation for dock employees and employees of contractors, a cafeteria, with seating accommodation for over 200, has been provided. For the benefit of crews of ships in dock, a separate kitchen capable of providing meals for 1,000 men has been constructed. In addition, lavatory, washing, and bath facilities for ships' companies have also been provided. The total cost of the dock to 30th June, 1948 amounted to £1,229,584.

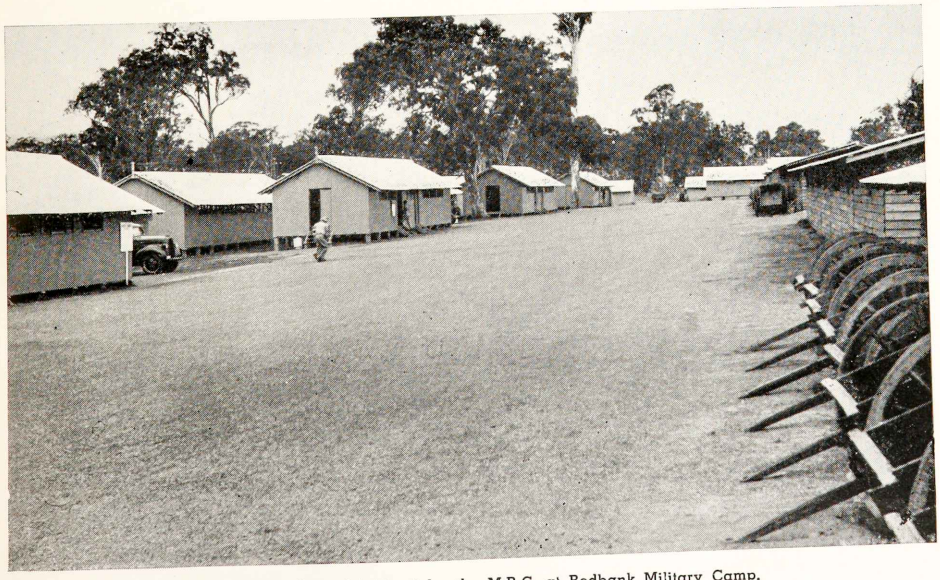
Efficiency Proved.

The Brisbane Graving Dock has proved that it is an efficient major repair unit. It has been in operation since June, 1944. In addition to two aircraft carriers—"Unicorn" and "Slinger"—of 26,782 and 15,012 tons repectively, a total of 126 vessels (aggregating 457,000 gross tonnage), including merchant ships, tankers, destroyers, submarines, and armed merchantmen, had been docked up to 31st May, 1946. By the 30th June, 1948, the number of vessels of all sorts docked had reached 194 with an aggregate tonnage of 685,043.

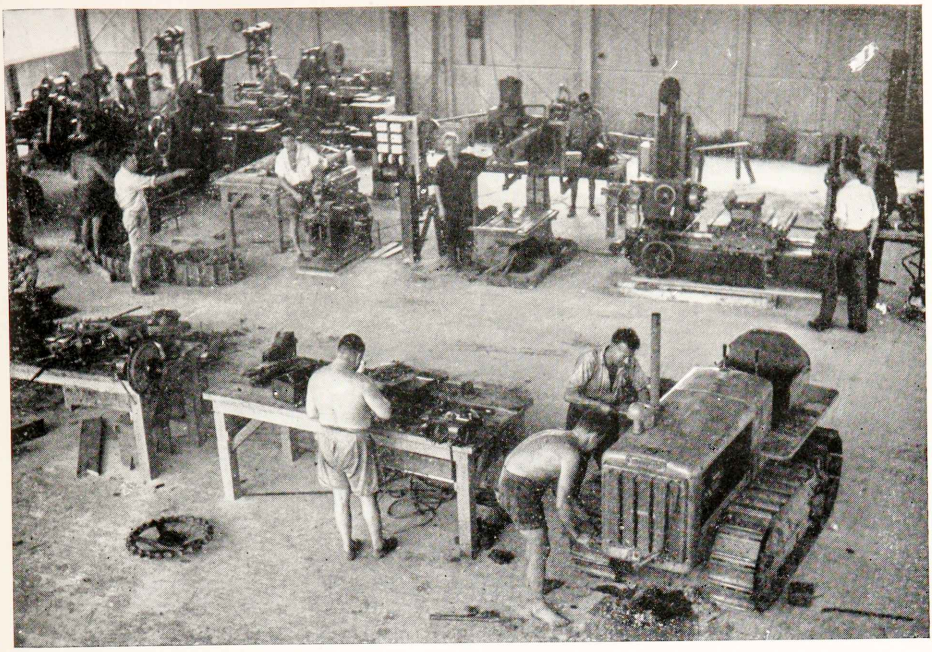
A sufficient area of land has been reserved as a dock site to enable an extension of the dock proper, if desired, and to provide for the establishment of engineering works and allied trades.



Sewerage pipes, 48 inches diaimeter, placed in an open cut of the Redbank Military Camp.



Unit Parade Ground laid out by the M.R.C. at Redbank Military Camp.



Interior of No. 1 Unit, Stratford Workshop, Cairns.

Interior of Mess Hut at the M.R.C. Camp, Cairns.

Men availing themselves of Savings Bank facilities provided at M.R.C. Construction Camps.

CHAPTER 9.

RAILWAY WORKS, BUILDINGS, AND CAMPS.

RAILWAY WORKS.

Transhipment Yards.

Thirteen jobs to the approximate value of £88,000 were involved in the construction of railway transhipment yards at Clapham Junction. A suburban area was resumed and several houses moved, difficult earthworks carried out, two streams diverted to avoid bridge building, and large filling consolidated. Loop lines were constructed to suit both 3 feet 6 inches and 4 feet 8½ inches railway gauge and a new bypass road built. Assistance was given to the New South Wales Railway Department to lay the tracks and most of the ballast was provided by the Main Roads Commission. A Civil Constructional Corps camp was established on the site and later this became one of the main camps in the Brisbane area. It was found necessary to alter the layout of the Yeerongpilly golf course and one short fairway with a bad creek hazard was eliminated altogether. A maximum of 120 men employed.

Earthworks and concrete floors for wool stores and landing platforms were later provided at a further cost of £2,901.

Charleville-Blackall Survey.

The idea of building a railway to connect Charleville and Blackall had for years been discussed until in 1942 it appeared that the exigencies of war would bring it into actual being, the military authorities wishing to complete an inland railway route between Brisbane and Townsville which, though circuitous, would be free from the dangers of the coastal railway. The Main Roads Commission was accordingly charged by the Allied Works Council with the responsibility of investigating several possible routes. Reconnaissance surveys of the country led to a trial survey of what was considered the most suitable route following an almost direct line from Charleville to Blackall, 154½ miles, and traversing much country suitable for closer settlement. This was practically the same as the route recommended by a Parliamentary Commission some years before and approved by the Railway Department. The survey was pushed ahead by the Main Roads Commission and completed towards the end of 1943 at a cost of £7,383. Copies of the plans were furnished to the military authorities and to the Queensland Railway Department, but nothing further was done. A defence road was, however, built by the Main Roads Commission connecting Charleville and Blackall at a cost of £114,000 and employing up to 211 men. It consisted of the usual formation, drainage, and gravelling and took 13 months to complete.

Mount Chalmers Line.

An important job in which the Queensland Railway Department and the Mount Morgan Mining Co. co-operated with the Main Roads Commission was the construction of a railway line and timber bridge connection to the Mount Chalmers Copper mine, together with the installation of ore crushing and loading plant, steam boilers and electrical equipment. Alien labour operating with Allied Works Council men provided satisfactory workmanship.

North Coast Line.

Seven railway crossing loops and one shunting neck were constructed to increase the capacity of the North Coast Line, the work extending from near Howard in the south to Felugia in the north. A gang of Civil Constructional Corps men had to be trained to do railway work and key men who commenced at Howard went on to the northern jobs. Buildings for railway staff accommodation were completed at five sidings.

Railway Sidings.

Railway siding accommodation with roadwork, grading, &c., was provided at Hamilton Cold Stores, also loading facilities for petrol, earthworks and drainage at Victoria Foundry siding, Townsville; roads, paths, and earthworks for railway siding at Tolmai (Richmond area) extension of siding with earthworks and roadway at Rocky Creek and Golden Grove near Atherton, a railway siding at Malanda, earthworks and loading bank at Baronta (N.Q.) ordnance stores, earthworks, formation and loading bank facilities at Mount Isa supply depot.

Railway Loop.

Earthworks were constructed, rails laid, points, crossings, and signals stands provided, and staff quarters erected at a railway loop between St. Lawrence and Kalarka at 510 miles 30 chains.

Emerald.

A railway siding was extended at Emerald.

Alexandria Railway Bridge.

The Alexandria railway bridge at Rockhampton was timber decked and approaches constructed to carry military road vehicles.

Bowen.

A shunting line with a low timber bridge about 100 feet long was constructed at Bowen.

Cairns.

The work of filling, ballasting, and constructing a railway siding to Canteen Stores, Bunda street, Cairns, was carried out by the Main Roads Commission.

BUILDINGS AND CAMPS.

Building jobs and the preparation of sites for buildings to the number of over 360 were carried out by the Main Roads Commission in locations extending from the southern and western borders to the top of Cape York, and varying from huts for ablutions to the preparation of extensive hospital sites, besides additions

and alterations to existing buildings. Many of these have been mentioned in the sections relating to aerodromes, fortifications, and naval installations. The following may be accepted as further examples of this phase of Main Roads Commission activities:—

Sandgate Training School.

A task of major importance assigned to the Main Roads Commission in 1940 was in connection with an R.A.A.F. station and training school at Sandgate. The site selected was on reclaimed land adjoining the Hornibrook Highway, where the work included clearing, grubbing, and paving areas for a parade ground, sports ground and cricket ovals, deck tennis courts, car parks, paved areas around barracks, trimming, gravelling and draining tent and hut locations, construction of the main entrance roadway and placing water supply, sewerage, and storm water pipes under the paths and paved areas. The estimated cost was £10,250. At the termination of hostilities the whole of this establishment was taken over by the Queensland Government and used as a home for aged people.

Military Warehouses.

An urgent job was the construction of concrete floors for military warehouses at Meeandah, Banyo, and Virginia for which a maximum of 80 men was employed and expenditure totalled £33,900. A central mix plant was erected at Banyo to make premix and harsh concrete. Over 4,000 cubic yards were delivered, some of it carted over 7 miles. So urgent was the need for storage space that in one instance the floor was loaded up within 24 hours of the concrete being placed.

U.S. Naval Hospital.

A letter from the Public Works Officer, United States Navy, addressed to the Works Director, Allied Works Council, Department of the Interior, Brisbane, and dated August, 1944, contained the following:—

> *This office was in an embarrassing position on 15 May, 1944, when it was determined that the contractor who had the contract to perform 25,000 sq. yds. of surfacing at the U.S. Naval Hospital, Camp Hill, was not in a position to start this work until early in June. An appeal was made to the Works Director for an immediate change over and some one found who could carry out this work in the most expeditious manner. The Main Roads Commission upon the request of the Works Director inspected this job, assembled their equipment and were at work on the job in five days. The work was carried out in a speedy, efficient manner and the quality of the job was excellent. This office expresses its appreciation of this fine co-operation.*
>
> (Sgd.) G. B. WALES, Lieut. CEC. U.S.N.R.
> Public Works Officer.

Tamborine.

For an American camp at Tamborine 40 miles of 16-feet roadway was constructed, the main road into the camp area surfaced with bitumen for 12 miles, and all bridges within a radius of 10 to 15 miles strengthened to carry heavy military convoys.

Redbank.

At Redbank military camp the existing rifle range was completely rebuilt, sites were prepared for stores, extensive sewerage and drainage provided, access roads constructed, and bitumen areas laid down.

Canungra Training Centre.

A guerilla training camp was established at Canungra for which the Main Roads Commission cleared the parade ground, formed and graded 4,000 feet of roadway and paths, and provided water supply and drainage.

Mount Gravatt.

For the 3rd Australian Advanced Ordnance Depot, Mount Gravatt, the Main Roads Commission gravelled roads, also floors for a 100 feet by 25 feet shed, erected two prefabricated U.O.L. stores, prepared sites for a car park and igloo shed.

Victoria Park.

The transport and erection of portable huts, with the provision of necessary services for a camp of enlisted men was done by contract, the Main Roads Commission constructing the roads, paths, and drainage.

New Farm.

For a naval victualling store at New Farm (Brisbane) the Main Roads Commission carried out the boring for foundations, removal of trees, earthworks, and construction of road approaches at an approximate cost of £3,097.

Beenleigh.

All interior road work was carried out by the Main Roads Commission at the L.H.Q. Tactical School area, Beenleigh Show Grounds.

Carbalah.

When an extensive military camp was set up at Cabarlah, some miles from Toowoomba, the Main Roads Commission was charged with the job of clearing, grubbing, trimming, drainage and surfacing the roads within the camp area, also an access road from the camp to the military supply stores near the Cabarlah railway station. Some tar spraying within the camp was done by contract under Main Roads Commission supervision.

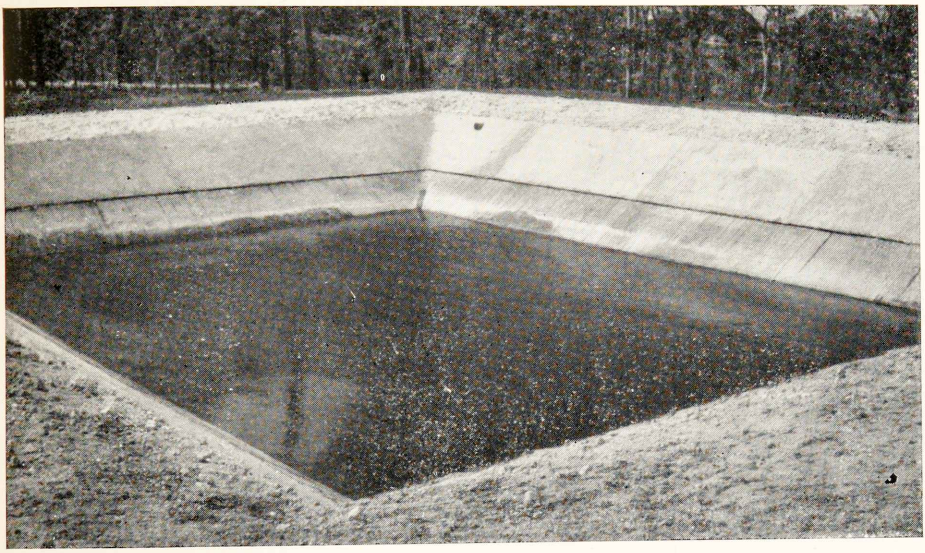
Maryborough.

The provision of a Divisional camp in the Maryborough area for the United States Army was listed as "most urgent." The Main Roads Commission laid down approximately 25 miles of gravelled roadway in the area of this camp and the main approaches. Several bridges were built and a considerable amount of cross drainage provided. The total expenditure approximated £40,000 with a maximum of 90 men employed. Roads and paths were also constructed for a 500-bed tented hospital at this camp, also storage tank sites on a staging camp.

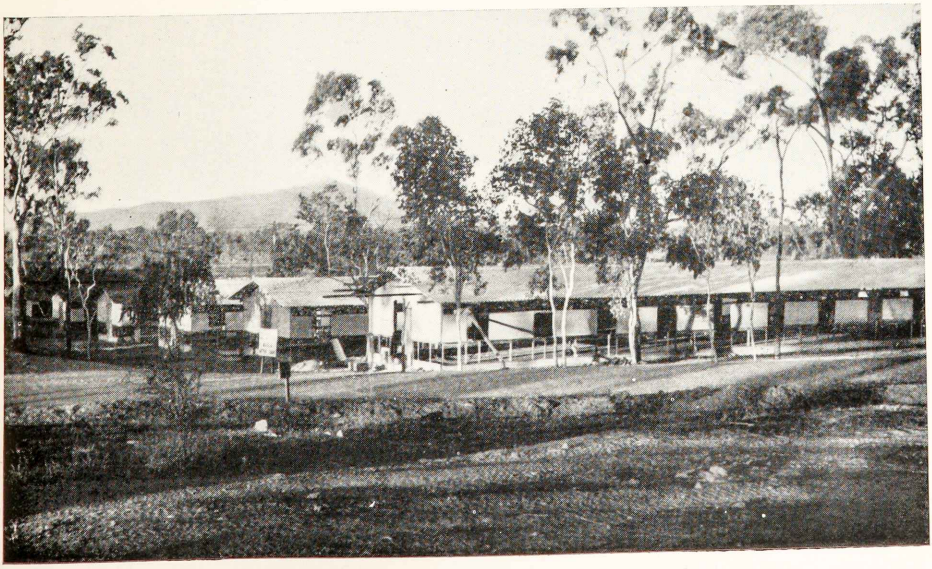
Rockhampton.

The construction of buildings for a U.S. Army camp in the Rockhampton Botanic Gardens, also huts at Cluden for a U.S. coloured labour corps, together with a considerable amount of work for the Air Observation

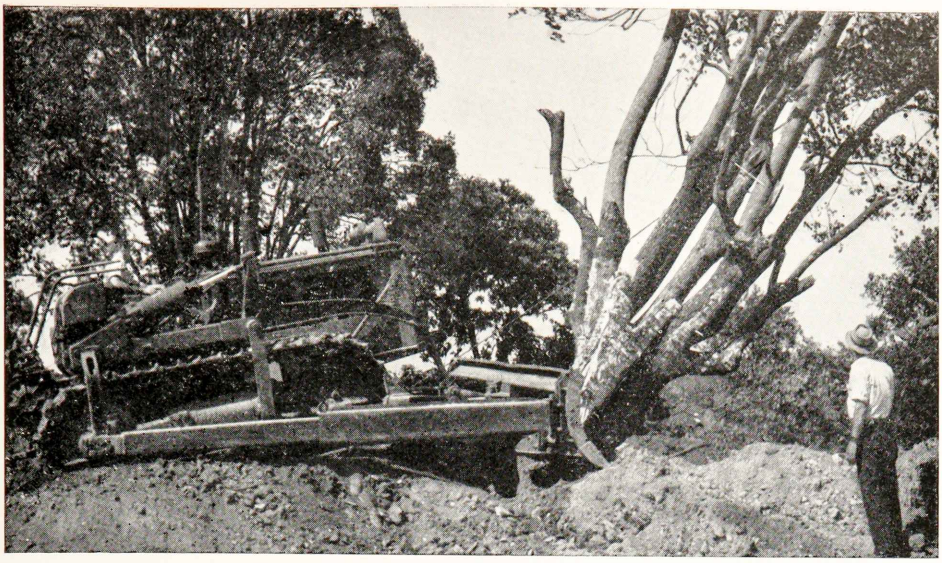
Sectional view of an Ordnance Camp erected by the M.R.C.



Sullage unit at the Atherton-Tolga Ordnance Camp.

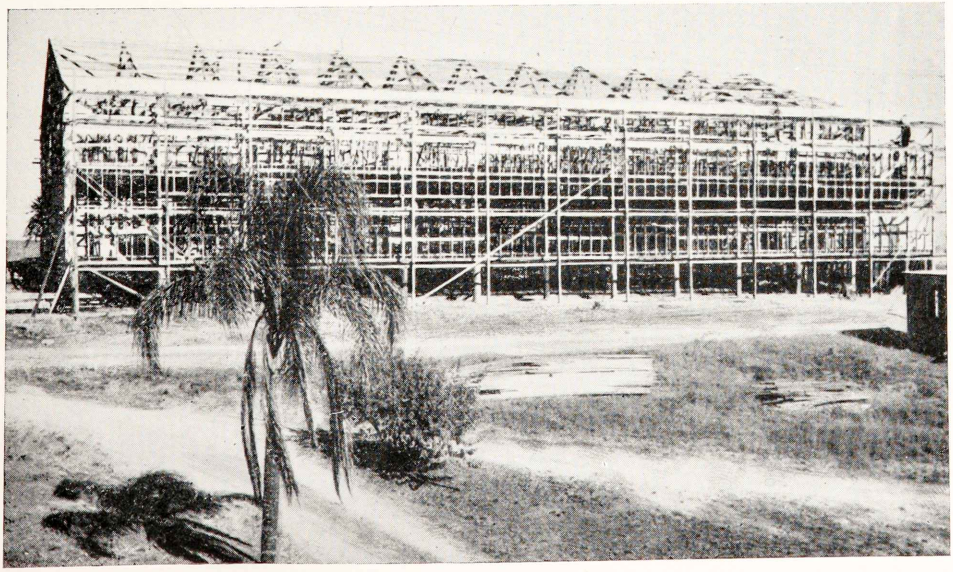


Camp for U.S. Forces at a North Queensland aerodrome.



Bulldozer felling camphor laurels at New Farm Naval Stores, Brisbane.

U.S. Hospital Camp at Holland Park, Brisbane, where much work was done by the M.R.C.



Framework of a large building erected for United States Army personnel in North Queensland.

Corps was carried out by the Main Roads Commission. Improvements at the Rockhampton drill hall included levelling the parade ground.

Calliope.

A site was prepared for a United States Army training camp at Calliope.

The Caves.

In November, 1942, the Main Roads Commission was requested to carry out work in connection with housing, water storage, road construction, &c., for a U.S.A. Divisional camp at The Caves, near Rockhampton. The work was well advanced, trenches dug, some pipes laid, mess huts completed, men were at work on building sites, the fabrication of buildings was well advanced, practically all necessary material ordered, much of it received, and on the way, when other plans were made and the work stopped. The Main Roads Commission then went on with construction work on the Rockhampton-The Caves section of the Northern Highway and maintenance work between Moore and Etna Creek. Some work was later carried out by the Main Roads Commission at a U.S.A. Amphibian Brigade camp at Nerimbera (Rockhampton).

Bowen.

A camp for R.A.A.F. officers and men was provided by the Main Roads Commission at Bowen Advanced Operational Base, including water supply, reservoirs, kitchens, mess rooms, operation rooms, the erection of 100 prefabricated huts, administrative building, meat and cold storage rooms, access road, &c.

An important flying-boat base for the R.A.A.F. was established at Bowen in addition to the foregoing, the Main Roads Commission providing the buildings and services. These included the erection of a maintenance workshop, a hangar, an emergency power house of concrete, a taxiway to dispersal strips, drainage and the removal of street poles to new positions. Sites for buildings, paved ways and hardstandings had first to be cleared and levelled.

A slipway with facilities for beaching flying boats was constructed with concrete apron and anchor blocks, additional planking and bitumen surface on the jetty, also alterations to several buildings in the township for use as squadron headquarters and barracks. Approximate cost £37,294.

When additional facilities were called for at this base the Main Roads Commission laid down 14,500 yards of concrete paved areas, for which 600 tons of cement were used.

Townsville.

In 1942 the Main Roads Commission was requested to carry out as an urgent job the construction of a headquarters settlement for the United States Army in Townsville. The site had to be cleared and levelled and 70 buildings erected in groups of ten and twelve, the layout to represent an urban development; the buildings to be timber framed, with fibrolite walls and roofing. The Townsville building, joinery, carpentering, and plumbing organisations agreed to carry out this work under the direction of the Main Roads Commission, each contractor acting as a foreman over his own staff. Two joinery establishments were taken over, the Timber Merchants Association guaranteed supplies of timber, and fibrolite agents agreed to supply and erect all such material required. The job included water supply and sewerage, in which the Townsville City Council co-operated. The construction of a large concrete building for administrative purposes, with the provision of roads, paths, &c., was done by the Main Roads Commission. The approximate cost including some outside work for which this was a "mother" job, approximated £105,825.

At Garbutt the Main Roads Commission transported a prefabricated warehouse to the site, laid down foundations and concrete floors, erected the building, and built an access road.

Town Common, Townsville.

Access roads totalling between 20 and 30 miles in length were constructed and paving of large bomb stores carried out on the Town Common at Townsville together with gravelled areas for storage of munitions and other supplies.

Black River.

A site for a 1,000-bed hospital was prepared at Black River, near Townsville, roads, paths, and drainage provided and concrete delivered for the paved areas.

Stuart.

Sites were prepared, with bitumen-surfaced roads and paths, for warehouses and ordnance stores at Stuart.

Charters Towers.

Alterations and additions were made at the Charters Towers hospital and alterations made to a building used as a service club.

Macrossan.

In addition to the R.A.A.F. fighter and repair field at Macrossan, referred to elsewhere, a large stores depot was established with a special railway siding and loading platform. The Main Roads Commission did the whole of the filling, grading, and drainage for the siding, constructed access, interior roads, and paving to the stores area, also access, paved areas, drainage and water supply for R.A.A.F. and W.A.A.F. camps.

Atherton Tableland.

The arrival of several divisions of A.I.F. on the Atherton Tableland in 1943 entailed an enormous amount of building construction. The Main Roads Commission promptly acquired the entire output of scantling timber from all mills on the Tableland, carried out a large part of the building required, particularly in the early stages, and supplied great quantities of material to the contractors who were subsequently employed. Work on Forestry roads, costing approximately £75,000, was also carried out to enable the logging of timber required for Defence works and aircraft production. The ultimate cost of the Tablelands building programme approximated £450,000, whilst material and services supplied to contractors approximated a further £200,000. In addition to

innumerable jobs carried out on requisition from army engineers the following work was done:—

Atherton.

Accommodation for officers and men, with roads, paths, drainage, &c., was provided by the Main Roads Commission at Atherton. This job included the erection of a bakery with three ovens, cost £14,274, and an extensive cordial factory was taken over and extended. A camp was also provided at Atherton for personnel of the Women's Land Army. This comprised sleeping huts, kitchen, laundry, mess, ablutions, change room, electric light and power, paths, drainage, clothes lines, &c.; cost £7,531.

Rocky Creek.

At Rocky Creek, near Atherton, clearing, road and path building, drainage, and delivery of concrete for paved areas were provided for a convalescent hospital of 1,000 beds, two army hospitals each of 1,200 beds, and medical stores, also post office and railway siding provided.

Mareeba.

A station hospital of 250 beds with all accessories of paths, drainage, &c., was provided at Mareeba by the Main Roads Commission.

Kairi and Danbulla.

A post office, four store buildings, several large recreation buildings, with hot water and showers, were provided by the Main Roads Commission, who also prepared sites for buildings erected by contractors.

Wondecla.

A railway goods shed, D.I.D. stores, post office, hot water and shower blocks, were built, and sites levelled for contractors.

Golden Grove.

Construction of two large railway goods sheds, 16 stores, camp buildings, and cold rooms.

Wongabel.

Post office, hot water and shower blocks, latrines, and sites prepared for contract buildings.

Ravenshoe.

Bakery, post office, D.I.D. stores, hot water, and shower blocks.

Mount Surprise.

Camp buildings for R.A.A.F. and water supply.

Tolga.

Construction of railway siding, ammunition stores, drainage work, the erection of numerous camp buildings, and preparation of sites for contract buildings.

Gordonvale.

Camp buildings and water supply for two American Paratroop regiments with two large parachute-drying buildings and alterations to various buildings taken over by the American forces.

Kurukan.

A large ammunition and bomb storage dump was constructed at Kurukan in the Northern District. This involved some miles of gravelled access road and several acres of dump sites.

Portland Roads.

At Portland Roads, Sydney Williams huts were erected for stores and radio station with camouflage, and water tanks erected.

Cooktown.

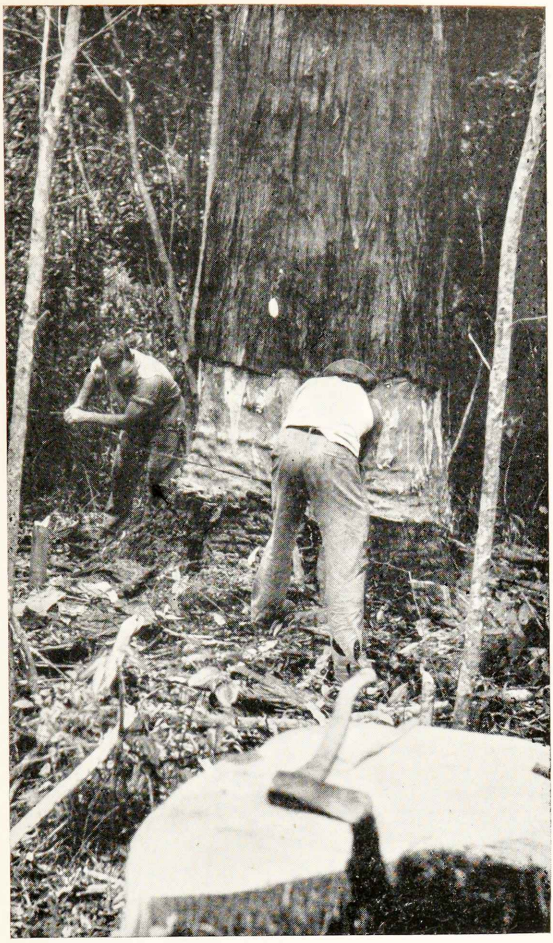
For an R.A.A.F. radar station at Cooktown the Main Roads Commission delivered and erected a central tower and transmitting station, two power houses with engines, power poles and splinter-proof traverses, built roads and drains, paved a site for a petrol dump and provided access.

Staging Camps.

Staging camps, with incidental levelling and road work, were prepared at Redlynch, Mount Isa, Camooweal, Oonoonba, and No. 3 bore.

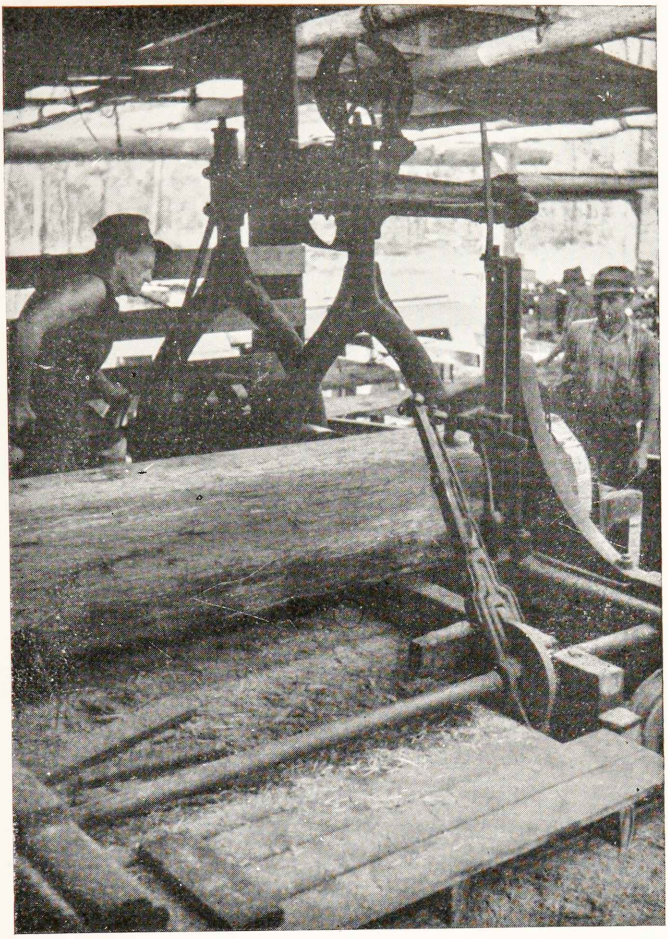
Ration Stores.

Ration stores and Sydney Williams huts were erected at various centres, including Thursday Island, Jacky Jacky, Portland Downs, and Cooktown.

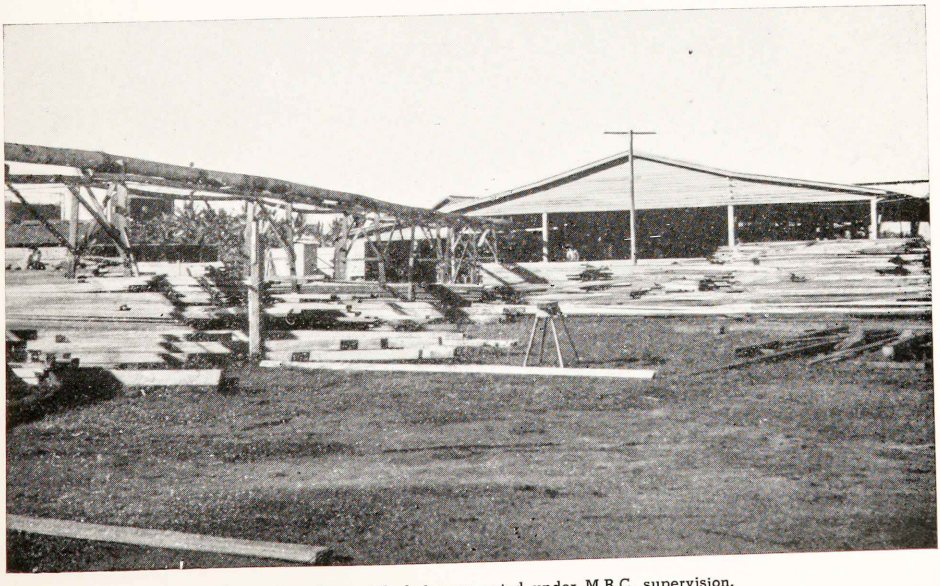


Felling timber with a crosscut saw at the Mt. Spec Timber Camp, North Queensland.

Section of newly felled tree being drawn to loading site.



Men at work in a North Queensland sawmill under M.R.C. direction.



Sawmill at Townsville being operated under M.R.C. supervision.

Loading logs on to jinker by means of tractor operated winch.

First aid promptly rendered in a Main Roads Commission Camp.

CHAPTER 10.

GENERAL.

Main Roads Commission files contain particulars of over 600 jobs carried out but not classified elsewhere in these pages, and which may be mentioned under this heading.

Anti-Malarial Drainage.

To safeguard the health of large bodies of men stationed at Cairns and to eliminate as far as possible the incidence of malaria, the Defence authorities in 1943 asked for the drainage of a considerable area of swamp. An inspection was made by the Director-General of Health and Medical Services, Sir Raphael Cilento, and topographic and feature surveys were made covering and area of 2,800 acres. It was arranged that Army labour should be used for some portion of the work, that the Main Roads Commission should provide men for the remainder, and supervise the undertaking generally, the Queensland Government to provide £15,000 towards the cost, with Army requisitions to cover the balance. Owing to a shortage of tractors at the outset it appeared that the use of horse-drawn vehicles would be necessary and 50 animals were secured, but the power shortage was overcome and the animals dispensed with. The work involved the alteration of some road alignments, the erection of timber bridges over Moody Creek and placing flood gates at the mouth of Saltwater and Moody Creeks.

In addition to the foregoing, swamp areas were filled and drained at other centres, including the Long Pocket camp at Indooroopilly.

Floating Dock.

Late in 1944 plans were launched for the construction of a floating dock for the British Admiralty, adjacent to the Queensland Graving Dock at Cairncross on the Brisbane River. The task of excavating the basin and laying down the concrete floor, together with dredging, access road, construction, water supply, fencing, and facilities for flood lighting, was allotted to the Main Roads Commission. Considerable progress had been made when a halt was called in June, 1945. The expenditure at that stage had reached £10,007, and 229,056 yards of earth and rock had been moved.

Flying Boat Bases.

Work connected with the establishment of flying boat bases was carried out at Hamilton (Brisbane), Bowen, Townsville, Cairns, Karumba, Groote Eylandt, and some other centres, where slipways were also constructed under difficult conditions.

Timber Supplies.

The maintenance of adequate timber supplies at all centres provided a major problem which was made more difficult by shortage of labour and means of transport. To overcome this the Main Roads Commission found it necessary to take over and operate a number of existing mills and to establish others. For instance in 1942 timber was urgently needed for work at Horn Island and Jacky Jacky. The nearest point from which it could be obtained was Cairns, where available supplies were limited and shipping space frequently not available. Investigation disclosed the existence of considerable stands of hardwoods and of softwoods in the vicinity of Red Island Point, near the tip of Cape York, and a mill was accordingly erected at an approximate cost of £3,000 after the necessary machinery had been gathered from various distant centres. Under Main Roads Commission direction sawn timber was produced at this mill for from 20s. to 25s. per 100 super feet as against 80s. for timber brought from Cairns, besides considerable economy in transport. In the following year (1943) a timber mill was established also at Iron Range and worked on similar lines, the sawn timber being charged to the various jobs at cost of production. The timber needs of the Australian forces were met by allowing them to provide their own logs and work special shifts with their own men at the mill. Mills taken over in the Northern area included Peberty's mill at Townsville and Torelli's mill at Hidden Valley near Ingham with logging facilities at Mount Spec, where a mill was also established. A sleeper mill was operated at Moongabulla on the Townsville-Ingham line, where a railway siding was built. In addition to the foregoing and those mentioned elsewhere small mills and joinery works were taken over and operated in various parts of the Central and Southern districts, where increased production became necessary.

Urgent work was also done by the Commission in constructing and extending forest roads, particularly in North Queensland where operations were frequently hampered by wet weather.

Small Arms Range.

A new rifle range was constructed at Belmont, the rifle range at Redbank reconstructed, small arms ranges built at Enoggera, Eagle Farm, Redbank, and Sellheim, bore sighting ranges at Charleville and Garbutt, and a machine gun range at the Bowen flying-boat base.

White Ant Extermination.

When the woodwork of buildings used in defence work in North Queensland, including R.A.A.F. property at Bowen, was found to be infested with white ants, the task of eradicating the pests and protecting the timbers was allotted to the Main Roads Commission. It was just another job which lent variety to the larger undertakings.

Bitumen Sealing.

The bitumen sealing of flight strips and taxiways was an essential feature on all areodromes carrying heavy combat and bomber planes. In order that the sealing process should continue without any interruption owing to wet weather, a bitumen emulsion was used, particularly in the north. To produce this emulsion plants were established at several centres, including Charters Towers, Oonoonba, and Mount Isa, operated under license from and the technical direction of Emoleum Ltd.

Improvisation.

The war effort of the Main Roads Commission called for the exercise of much ingenuity in overcoming difficulties that arose from time to time in remote areas. For instance on one occasion it became necessary to provide a water supply at short notice to a four-squadron camp of the Fifth American Air Force at Mareeba. This involved pumping on a 200 feet vertical lift from the Barron River.

A suitable centrifugal pump was not available, but a reconnaissance of old mines in the area located a force pump of the plunger type which was adapted for the purpose. Flanged galvanised mild steel piping, which had once served for dewatering deep trenches in the construction of underground works at Townsville, anchored to the precipitous river bank, served as a delivery pipe. The overall visual effect was somewhat "Heath Robinsonish" but it worked until more modern equipment became available several months later.

At Horn Island the landing jetty in 1940 was only suitable for foot traffic and there was no provision for landing heavy equipment and plant. A rockfill mole was constructed outwards from the beach and used for disembarking heavy tractors and other plant from wooden barges.

In the construction of aerodromes and road works on the basalt boulder country of the Atherton and Conjuboy tablelands in the early stages of the war no road ripper strong enough to loosen the boulders was available. A ripper which answered all requirements under severe actual working conditions was improvised from an old 5-ton truck front axle, which was cranked and incorporated into a welded mild steel frame. Its performance equalled that of the heaviest type rippers which later became available.

At Mareeba aerodrome, in the early stages of construction when power graders were scarce, an improvised grader was constructed in the form of a 33-foot triangle made of 18-inch diameter logs fitted with steel cutting egdes. It was so effective that the first runway on this aerodrome was completed and in use in the record time of seven days.

At Mareeba aerodrome, too, the dust nuisance in the early stages of use of the unsurfaced runways was countered by the application of a solution of sugar molasses and water. The Commission does not claim to have originated the idea, but it was probably the first authority to have applied it successfully in practice.

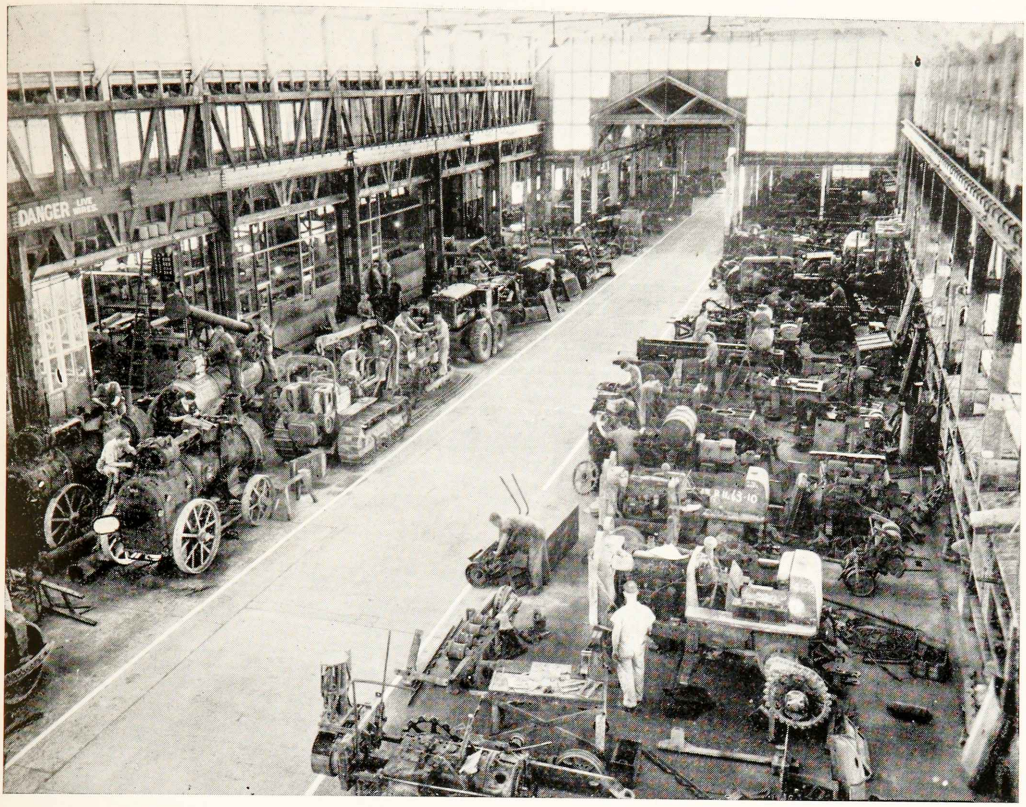
A central concrete-mixing plant was established at Rocky Creek near Atherton from which many thousands of yards of concrete was produced and delivered to points up to 15 miles distant in 500-gallon containers mounted on trucks. Compression strength of the concrete of the maximum load was 3,000 lb. to the sq. inch. The saving in time and cost of production in supplying concrete from this source to a large number of works in the area was very considerable.

Handling and placing accurately in position of 3.7 A.A. guns was effected by the use of a specially constructed timber frame supporting two 8-ton capacity endless chain hoists. This enabled guns to be unloaded from road trucks and placed accurately to position and level within ten minutes.

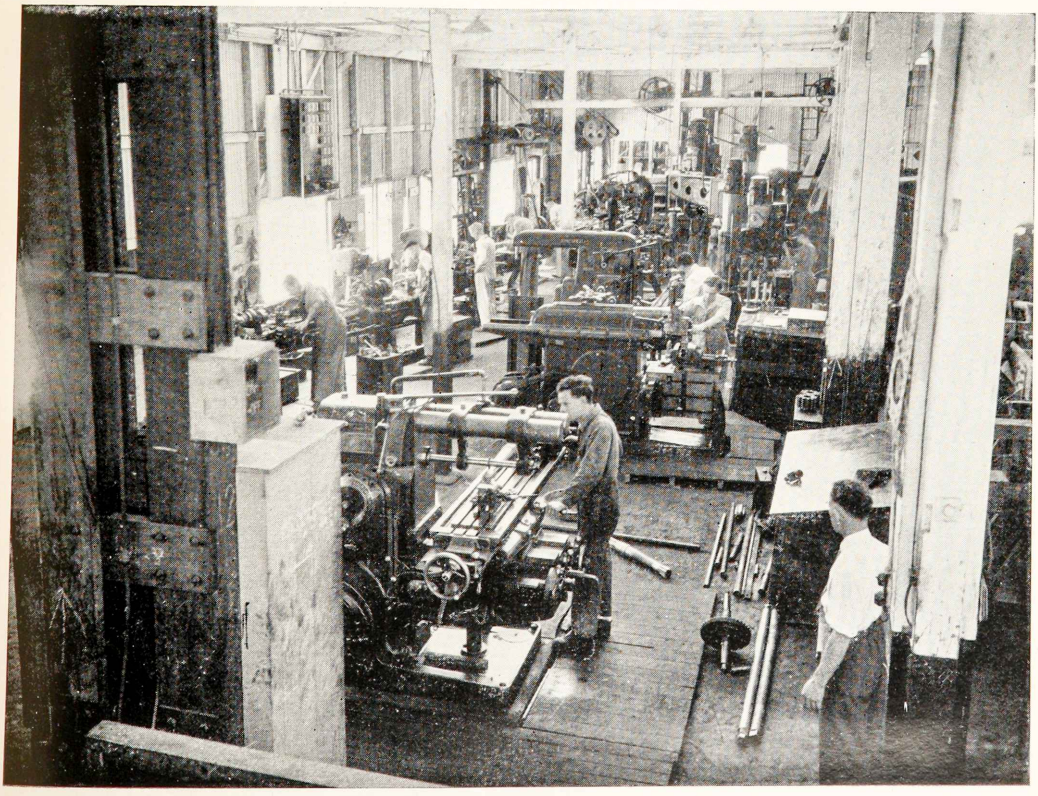
Miscellaneous.

An unusual task fell to the Main Roads Commission in 1946 when the Townsville Cemetery Trust sought to have the United States Army section of the cemetery put into good order. Levelling, clearing up, and repairs to fences were duly carried out.

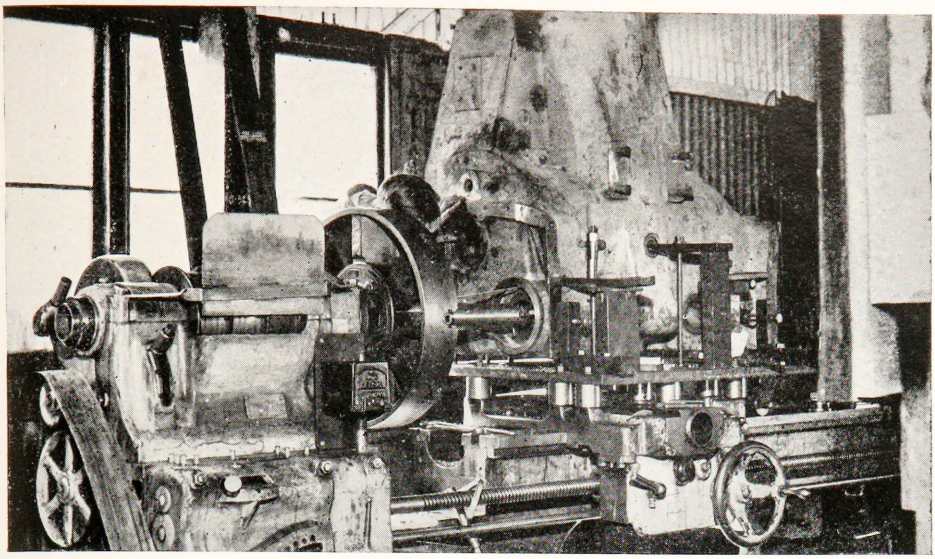
It may be said that the Main Roads Commission "stood to attention" with a ready response to the call for all sorts of tasks from the salvaging of a wrecked aeroplane at Townsville in December, 1943, to the provision of access to a quartermaster's chicken farm at Oonoonba.



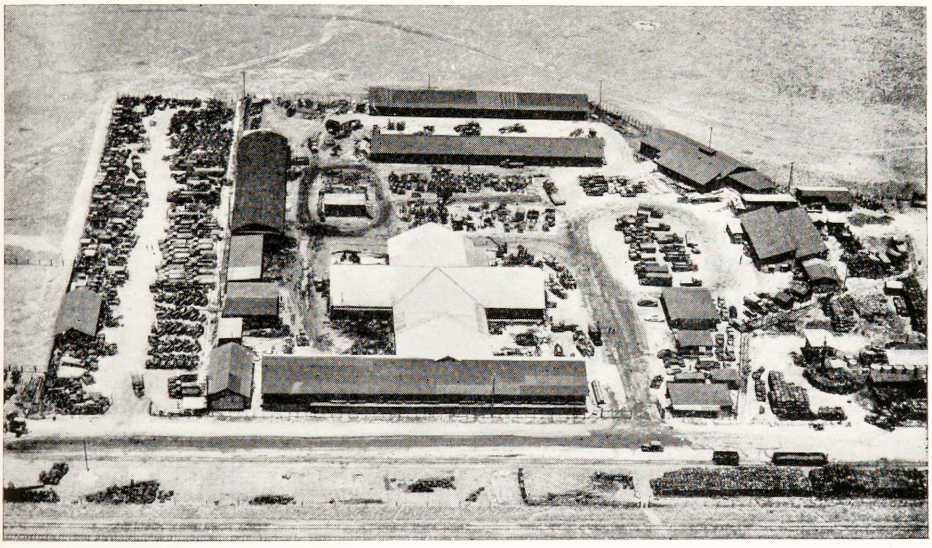
View of portion of Nundah Workshops, Brisbane, showing dismantling and reassembling sections.



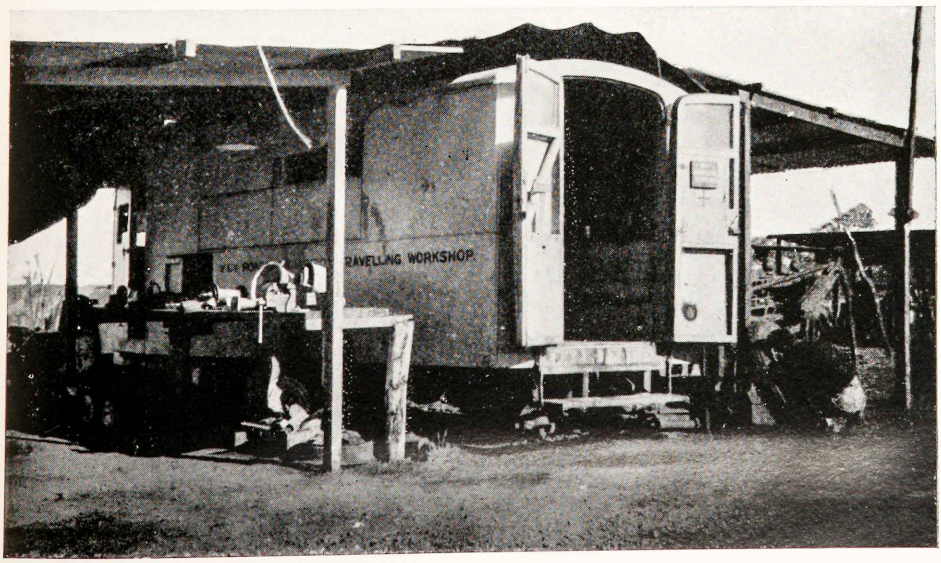
Section of machine shop at Nundah Workshops.



Nundah Workshops—Machining large tractor casting after repairs.



Aerial view of Workshop at Oonoonba, Townsville.



M.R.C. Travelling Workshop.

CHAPTER 11.

PLANT AND EQUIPMENT.

The Commission's earth-moving plant was used almost solely on defence works during the whole of the war period. Before the advent of Allied Works Council this plant bore the brunt of earth-moving projects in Queensland and in parts of the Northern Territory. To meet urgent needs additional plant was obtained wherever available in all parts of Australia.

Much Main Roads Commission plant worked two and three shifts daily preparing ground for air ports, munition factories, docks, military roads, army water supplies, &c. Owing to the urgency of these works, it was found almost impossible to keep the plant properly maintained. Lubricating gangs were introduced on the larger jobs, with an experienced driver in charge. Plant was serviced while drivers snatched food and minor repairs were effected by a field staff between shifts. Many plants suffered severely in consequence.

The following table gives items of plant most in demand owned at September, 1939, and at cessation of hostilities in 1945. The last column in table shows items held at the end of 1946 for post-war reconstruction.

TRACTORS (I.E., WITHOUT DOZERS, &C.)

Size.	Owned.		
	1939.	1945.	1946.
14–20 drawbar H.P.	5	12	12
20–30 drawbar H.P.	38	95	93
30–40 drawbar H.P.	4	38	41
40–60 drawbar H.P.	..	12	12
60–80 drawbar H.P.	..	1	2
80–113 drawbar H.P.	..	..	1
Totals ..	47	158	161
TRACTORS WITH DOZERS.			
30–40 drawbar H.P.	9	20	57
40–60 drawbar H.P.	1	21	45
60–80 drawbar H.P.	3	20	34
80–113 drawbar H.P.	..	1	7
Totals ..	13	62	143
TRACTORS WITH END LOADERS.			
15–35 drawbar H.P.	..	3	11
GRADERS.			
Power	51 (20 to 39 B.H.P.)	68 (20 to 78 B.H.P.)	94 (20 to 78 B.H.P.)
Large drawn ..	27	48	45
Small drawn.. ..	79	80	79
Totals ..	157	196	218
SCOOPS.			
3½ to 10 cub. yard capacity	4	15	30
Under 3½ cub. yard capacity	65	211	211
Totals ..	69	226	241

There was very little change in the number of other major items of plant owned during the war period, those listed above being in greatest demand. The total number of plant items was as follows:—1940, 1,215; 1945, 2,107; 1946, 2,513. Owing to the great scarcity of plant during the war years, only 225 items were written off, and much that normally would have been written off had to be reconditioned.

Maintenance of Plant.

In South Queensland this Commission was called on to repair practically all Allied Works Council plant and much plant for the Allied Forces, both in Australia and overseas, in addition to its own. Extensive additions to both buildings and equipment at Nundah workshops were necessary to cope with the work. Additions included 22,200 square feet to main fitting shop, 4,250 square feet to woodworking shop, and 10,000 square feet of shelter sheds for plant.

In 1939, Nundah workshops were equipped with 23 machine tools, &c., valued at approximately £1,500, and small tools valued at £950. In 1945, totals were 95 machine tools valued at £20,000 and small tools valued at £3,900. Equipment installed during the war period comprised milling machines, radial drills, turret lathe, lathes, presses, shears, two types of heat treatment furnaces, 10-ton all-electric travelling crane, portable cranes, Diesel fuel injection repair equipment, crankshaft grinder, extensive electric welding installations, electrical accessories, repair equipment, &c.

At one time there was great delay in getting the larger crankshafts ground; frequently these took up to six months. Inquiries for a machine to do this work gave most discouraging results, so it was decided to design and build one. A general arrangement and some twenty-eight detail drawings were prepared in the mechanical section and the machine was fabricated at Nundah. As the bed was too large to heat-treat the machine this was done at Northgate, but the rest of the work was done at the Commission's own workshop. The machine works on the centreless principle, the shaft revolving at 20 r.p.m. and the stone at 10,000 r.p.m., each driven by a separate motor. The resulting machine can grind the largest and the smallest crankshaft in use by the Main Roads Commission and also the Allied Works Council, and a second-year apprentice can get an accuracy of .0005 inch on any journal, both for parallel and round. A tradesman can get closer.

The design was well enough thought of after investigation by the military for them to request negative prints and call quotations. It is understood that they were just about to place orders when a supply of machines was received from U.S.A. Several private firms have obtained blueprints, with the intention of making their own.

Owing to the scarcity of spare parts, methods had to be improvised for repairing broken, damaged, and worn parts that would have been considered quite beyond repair in 1939. Large numbers of these were successfully repaired and gave years of useful service, many being still in use. This work was so successful and economical that much of it will be continued, particularly repairs to broken tractor cases, expensive gear wheels, cylinder blocks, &c.

However, it was still necessary to have some spare parts, and frequently these had to be manufactured, hence a salt bath furnace was required and again was unprocurable at the time needed, therefore one was designed and manufactured by the Main Roads Commission. It is entirely satisfactory.

Travelling Workshops.

During 1937 the Commission built its first travelling workshop. It was electrically equipped and was a great success. During the war six further workshops were built and fitted up at Nundah, two for the Main Roads Commission and four for Allied Works Council, the main modification being that they were more essentially for the repair of earth-moving plant, namely, tractors and their appurtenances. Several simpler workshops of somewhat similar design were manufactured by or for Allied Works Council elsewhere than Nundah.

A railway siding was built into the workshop yard. On account of the heavy type and volume of plant handled, the Nundah yard was regraded and gravelled.

When Japan entered the war, owing to the scarcity of officers and tradesmen with experience in the repair of earth-moving machinery, it became necessary for the Main Roads Commission to part with several of their best mechanical men who were seconded to various Departments of the Commonwealth Government. Despite this, the staff at Nundah workshops increased from approximately 38 in 1939 to a maximum of 165 in 1945. Much training of apprentice and dilutee labour was carried out.

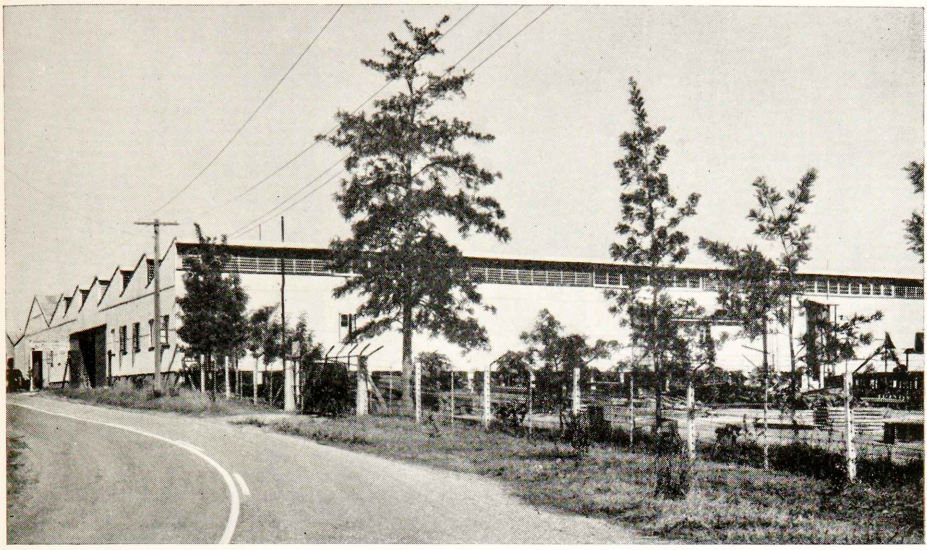
In addition to the above, private firms and garages throughout the country were largely used for ordinary repairs, and much good work was done by them. In most instances they co-operated fully with the Main Roads Commission, and parts beyond their capacity were sent to Nundah.

Workshop Activities, Rockhampton and North Queensland.

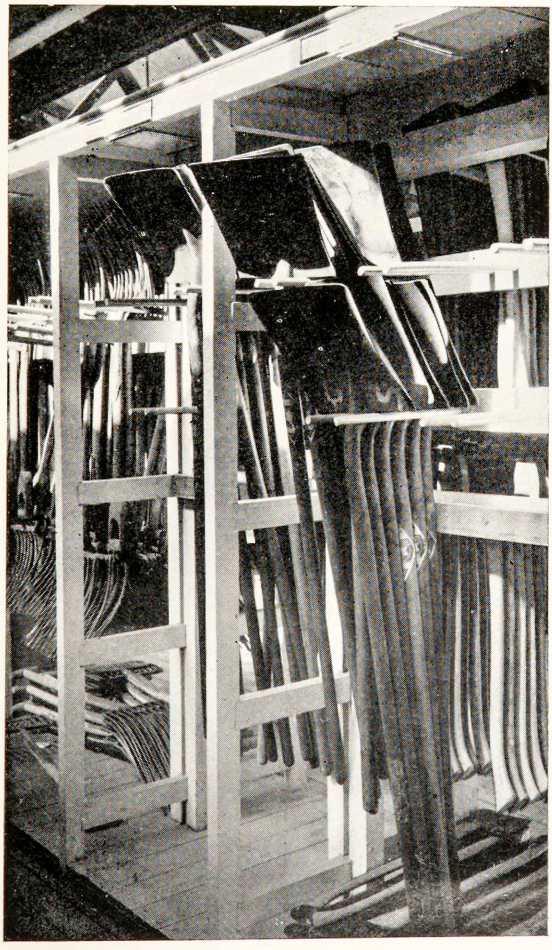
Staff was doubled during war years (6 to 12). Building size was approximately trebled. Equipment value rose from approximately £270 to £630, whilst value of machine tools increased from £149 to approximately £2,000.

Main Roads Commission workshops in North Queensland, which was very elementary at the commencement of the war, were taken over by the Allied Works Council, much of the work necessary on maintenance to Main Roads Commission plant being undertaken by Allied Works Council shops in North Queensland. On some of the larger jobs carried out in North Queensland the Main Roads Commission established their own maintenance shops. Two travelling workshops built by the Commission carried out repairs to essential plant in the Northern Territory.

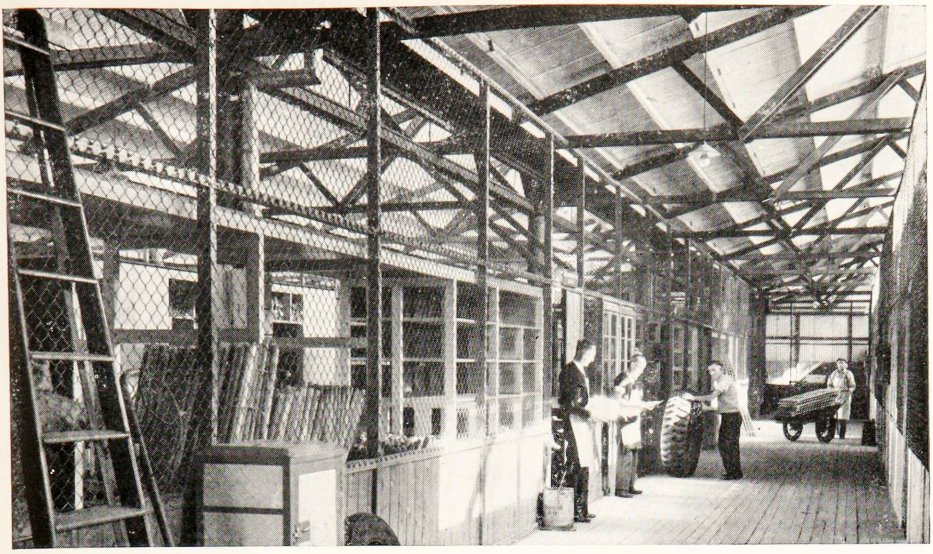
The Main Roads Commission has since acquired the Allied Works Council workshops at Stratford, near Cairns, and has greatly enlarged its Townsville workshops. At Parkhurst the Main Roads Commission workshops are being completely rebuilt and extended.



General view of new building erected during the War.



Method of storing shovels, metal forks, etc.



This shows the method of enclosing the various sections to ensure the security of contents.

A view of the Personnel Stores, mess gear, etc.

Storage of Road Signs.

CHAPTER 12.

STORES AND SUPPLIES.

When the Allied Works Council first commenced operations in Queensland, it had no stores organisation except that necessary for a minor Commonwealth works programme. To avoid the necessity of setting up a stores organisation, and to save time losses in a period of national stress, advantage was taken of the already established Main Roads Commission stores and supply set-up. In fact, the Commission became the chief storekeeper and supplier for the Council.

The Deputy Chief Engineer of the Commission was appointed Controller of Materials for the Allied Works Council in June, 1942, and he worked very closely in collaboration with the Allied Works Council Construction Manager. The Main Roads Commission Stores Supervisor and Supply Officer acted as his Chief Executive Officer.

Normally the store carried a stock of materials suitable for road works, including camp gear and equipment for workmen. Owing to the more diversified activities of the Allied Works Council, and to the special needs of the Civil Constructional Corps, the lines carried had to extend to items required for other engineering works, building undertakings and messing, canteen, medical and other supplies. Stocks had also to be carried to a far greater volume than had previously been the case.

In 1939 the stock in Main Roads Commission stores had a value of approximately £36,000, which was sufficient for the then normal Main Roads Commission programme of some £2,000,000 of permanent works and maintenance. In 1943, to cover defence projects under construction by the Allied Works Council and the Main Roads Commission, these stocks had increased to approximately £500,000.

Ordering and Purchasing.

The Ordering and Purchasing staff of the Commission increased from eight in 1939 to fifty-two at the peak period, and the Stores Staff in Southern Queensland increased from fifteen to one hundred and eight. Issues of general supplies and timber through stores in the Southern Division alone during the peak period averaged approximately £55,000 per month (£660,000 per annum).

To deal with the various aspects of supplies, the following functions were performed and controlled by the Purchasing and Supply and Stores Branches, under the direction of the Controller of Materials:—

1. The purchase and ordering of Allied Works Council supplies for messing, canteen, medical, accommodation (building) plant supplies, timber and general construction lines. Accounts were paid chiefly by the Allied Works Council.
2. The purchase and ordering of Main Roads Commission supplies for plant supplies, timber and general construction lines. Accounts were paid by the Main Roads Commission.
3. The purchase and ordering of general construction supplies for the Sydney Water and Sewerage Board during their construction of oil tanks in Brisbane. Accounts were paid by the Sydney Board.
4. Liaison with (and purchasing advice to) the officers of the New South Wales Main Roads Department, which operated from the Purchasing and Supply Branch. This Department constructed the Duaringa-Charters Towers section of the Inland Defence road.
5. Control of Timber supply yards and staffs at Strathpine, Meeandah, Virginia, Oakey, and Wallangarra.
6. Control and issue of bridge timbers stored at twenty-one different centres in the Southern Division. Main Roads Commission and Forestry Department timber inspectors were used for the purpose.
7. Control of bulk timber ex indent, and its cutting and issue from three major timber merchants in Brisbane. Main Roads Commission and Allied Works Council timber inspectors and staff were used. Certain refugee cargoes of steel and other lines were also controlled and issued.
8. Release and recording of all tractor parts throughout the State to Government Departments, Local Authorities, contractors, farmers, and other users. Releases were made under the direction of the Chief Executive Officer, Allied Works Council.
9. Release and recording of tyres and tubes required by the Allied Works Council, Main Roads Commission, and other Departments and contractors carrying out works on behalf of the Allied Works Council.
10. Issues through Stores of medical, messing, canteen, accommodation (building supplies), plant spares and accessories and general construction materials to the Allied Works Council, Main Roads Commission, Bureau of Industry, State Public Works Department, Local Authorities, and contractors under the control of those authorities, and also to Army Operational Units.
11. Control and issue of hutments and other buildings manufactured by the Bureau of Industry, State Public Works Department, and private contractors.

12. To ensure correctness of goods and deliveries and to enable prompt payment to be made to suppliers, a reception store was opened at Turbot street under the control of the Purchasing and Supply Branch, and large quantities of plant parts and general lines were forwarded through this store to large Allied Works Council and Main Roads Commission projects at Mount Isa, Darwin, Coen, Thursday Island, Horn Island, &c., also to Allied Works Council workshops at Oonoonba, Stratford, and Camooweal.

Increased Accommodation.

Owing to heavy increase of stocks, existing buildings were enclosed and new buildings for storage were necessary at Nundah, and these were enclosed and erected at a cost of approximately £23,000. Temporary premises in the city (top floor of a warehouse) and five shops in Nundah were rented for storage, pending the completion of the new buildings.

Large orders for supplies were placed with local and interstate suppliers. Some important individual orders included 2,000,000 super feet of building timber; 3,000 tons of cement; 500 tons of reinforcing steel; 50,000 yards of tentage material; ablutions, showers and latrines for 5,000 men; 1,960 hutments; galleys for 4,000 men; forms and tables for 5,000 men; 3 tyre retreading outfits; 3,000 assorted tyres and tubes for plant, &c.

The Public Estate Improvement Branch of the Lands Department, which had been operating in separate stores at Nundah, was absorbed by the Main Roads Commission and their existing stocks and certain staff were combined with those of the Main Roads Commission under the Nundah Stores Branch.

Liaison was effected with the Postmaster-General's and other Commonwealth Departments, and with separate Allied Works Council Stores at Enoggera, Virginia, and South Brisbane, and large quantities of materials returned from projects were received, sorted, classified, and taken into stock at various stores under Main Roads Commission control. Late in 1943 an Allied Works Supervisor of Stores took over the functions previously performed by the Controller of Materials.

Early in 1944 it was considered desirable from a State point of view that a definite agreement should be made as between the Main Roads Commission and the Allied Works Council to safeguard the State from ownership of an accumulation of stores which would not be required in the event of cessation of the activities of the Allied Works Council, and to limit the State's liability in the event of losses. This agreement, which was subsequently signed by both parties, also provided that the Main Roads Commission would retain a certain proportion of the stocks available.

This latter proviso proved valuable upon the commencement of the Main Roads Commission post-war programme, and was also of great help when the State Housing Commission commenced operations, as many of the lines retained were building materials which were in short supply.

CHAPTER 13.

TRANSPORT CONTROL.

In December, 1941, the Commissioner of Main Roads (Mr. J. R. Kemp) was appointed Director of Emergency Road Transport in Queensland under the National Security (Land Transport) Regulations. Owing, however, to his appointment shortly afterwards as Deputy Director-General of Allied Works for the State, the bulk of the transport work was carried out by Mr. G. W. Watson, Deputy Co-ordinator-General of Public Works, until taken over by a Directorate of Emergency Road Transport.

The Secretary of the Commission, Mr. J. E. England, was appointed Controller of Liquid Fuel for the Commonwealth Government and Chairman of the Liquid Fuel Control Board in June, 1940, and he held these important positions until June, 1943, when he was made available to serve as Chief Administration Officer in the Allied Works Council in Queensland. He held this position until August, 1944, when he returned to duty with the Commission.

Registration Branch.

The Registration Branch of the Commission carried out the administration and clerical functions in regard to the following Commonwealth Emergency Controls:—

Liquid Fuel Rationing;

Transport Control embracing—

- Control of operations of vehicles (in conjunction with the State Transport Commission),
- Release of tyres and tubes,
- Release of new and Army Disposals vehicles,
- Control of release of automotive spare parts,
- Control of release of new engines,
- Control of release of engine spare parts,
- Collaboration with manpower authorities re staff for garages and motor workshops,
- Acquisition of workshop plant and machinery, &c.,
- Assistance in obtaining supplies of saddlery and harness.

The duties which the limited staff of the Motor Vehicle Registration Branch were required to perform in connection with the above activities were in addition to their normal work relating to State motor vehicle registration matters, and demanded a maximum concentration of effort to ensure that, consistent with the achieving of the objects of emergency regulations, an efficient service be rendered that section of the Queensland community to whom the restrictions applied.

To obtain the utmost in the conservation of liquid fuel, rationing very necessarily was of an extensive nature and consequently restrictive use of petrol applied to all petrol-driven motor vehicles, motor launches, agricultural and road construction machinery, petrol-driven stationary engines, &c. Fuel for industrial purposes was also rationed. In addition to the administration required for the above, a further important phase, in itself a task of moment, was that of control of "licensed retailers."

As for the activities of the Directorate of Emergency Road Transport, those with which the Registration Branch was connected, entailed control over the release of motor tyres and tubes, new and Army Disposals vehicles, automotive spare parts, new engines and engine spare parts. Also motor garages and workshops came within the jurisdiction of the Directorate for the purpose of enabling supervision to be maintained with a view to ensuring that preference was extended in the matter of repairs, &c., to vehicles engaged on highly essential occupations. The functions of the Directorate embraced a wide sphere, and in addition to the above there were such miscellaneous sections of activity as the rendering of assistance in obtaining for use in Queensland saddlery and harness items, supervising the manpower position of motor garages, and firms connected also with the saddlery and harness trade, &c.

Commonwealth Controls.

At 21st August, 1940, the date on which the State Liquid Fuel Control Board commenced to function, the staff of the Registration Branch numbered 59. This staff was utilised over the initial stages of the petrol rationing, but with the ever-increasing volume of work temporary officers were appointed by the Liquid Fuel Control Board, so that by 8th October, 1942, approximately 127 permanent and temporary employees were engaged either full or part time on liquid fuel work. By September, 1945, when both liquid fuel and emergency road transport work was being performed, the permanent and temporary staff totalled 164. During the whole period, practically all of the officers of the Registration Branch were associated with the Commonwealth Controls and the senior officers were all engaged on this work either full time or part time.

As a result of enlistments, &c., the number of permanent officers decreased from time to time, thereby giving rise to an increase in the difficulties emanating from an already limited senior staff position. By considerable rearrangement, accommodation for the above organisations was made available within the Registration section of the Albert street Main Roads building, which, together with the benefit also derived from the use by both the Liquid Fuel Control Board and Directorate of Emergency Road Transport of the Main Roads Commission motor vehicle filing system, provided a very effective control with as little inconvenience as possible to all persons concerned.

Available space was taxed to the limit and the Liquid Fuel Control Board found itself obliged to arrange for additional accommodation for its ration ticket issuing centre and retailers section. These activities, however, were under the immediate control of permanent Main Roads Commission officers.

CHAPTER 14.

ACCOUNTS.

As the Works and Services Branch of the Department of the Interior had only a very small accounts organisation right up to the time when the Allied Works Council was inaugurated, the Deputy Director-General of Allied Works in his capacity of Commissioner of Main Roads, with the State Government's approval, arranged for much of the necessary accounting work to be undertaken by the Accounts Branch of the Commission, which already had a sound organisation for handling large-scale works accounts.

When the pressure of works increased, it being remembered that the Main Roads Commission was the largest single construction agency for Commonwealth works in the State, it became necessary to strengthen considerably the existing Accounts section in common with other sections of the Commission.

Additional officers were recruited from all sources, *inter alia,* the resources of commercial and other accounting organisations being drawn upon by means of compulsory call-up into the Civil Constructional Corps. Persons with accounts experience called into the Corps in this way were then allotted to positions in the Accounts Branch of the Commission.

In the early stages of Allied Works operations officers from Head Office and from district organisations of the Commission were made available to the Commonwealth in connection with the payment of salaries and wages of certain Allied Works Council employees until that authority was able to establish its own accounting organisations in the main centres of the State, whilst the Commission's ordering facilities were also extensively availed of by the Allied Works Council.

Allotments.

From July, 1942, until November, 1944, payment of allotments to dependants of members of the Civil Constructional Corps were effected and recoveries accounted for through the Accounts Branch of the Commission. The personnel dealt with included not only those engaged on jobs dealt with by the Main Roads Commission but also men on jobs for all departments of other States, for the Commonwealth, and for the various contractors. This made the control of allotments much more complicated and it became necessary to organise a special system to keep track of every individual employed.

The compulsory enrolment of men in the Civil Constructional Corps and their subsequent transfer to works in any part of the Commonwealth called for some special means of payments to their dependants when the transfer took place.

It was decided by the Allied Works Council that when a Corps member was transferred away from his home town an amount of £3 per week would be deducted from his wages and paid to his wife, the first payment being two weeks after his transfer took place and continued until such time as he was discharged from the corps or absent from work without pay for any reason.

The transfer of large numbers of men from Southern States to Queensland presented a new problem as regards the allotment section. The payment to dependants presented no difficulty as cheques were regularly posted each fortnight and the interstate paying officers continued payment until advised by the Queensland authorities to stop payment.

The men upon arrival in Queensland were sent to a staging camp from which they were drafted to any part of the State. In the early days of the corps, the transfer of men was too rapid and the number too great for the then inexperienced clerical staff to cope with the necessary transfer forms and consequently it was a frequent occurrence for men to arrive on a job without transfer forms. In these cases the job staff was at a loss as to whether to deduct allotments from wages or not and in many cases considerable sums were paid to dependants before the allottor could be located and arrangements made for the deduction from wages for current allotments as well as an additional amount to cover the amount overpaid to his dependant.

Method Adopted.

The additional amount deducted was based on the allottor's earnings and varied from 10s. to £3 per week according to amount earned each week and the amount of overpayment, consideration being given to each case in order not to incur any financial hardship.

One of the difficult problems in the system was the prevention of overpayments to the dependants of men who were released at various times for work in seasonal industries; although special means were devised to cope with the situation, it was found that notification of releases from distant centres often arrived too late to prevent an overpayment of these amounts. Also there was a definite Allied Works Council policy that the risk of non-refund must be taken. It must, however, be borne in mind that owing to the honesty of the Australian workman in general the greater bulk of these overpayments were refunded.

The total value of allotments paid through the Commission's accounts to wives and dependants of Civil Constructional Corps members amounted to £1,590,856 and during the period which the accounts were controlled by the Commission approximately 22,500 individual accounts were dealt with.

In view of such a large expenditure and the conditions operating, the fact that at the time of passing of the allotments from the accounts of the Main Roads Commission an amount of £12,619 14s. 2d. remained uncollected and the major portion of this amount represented deductions not yet in the accounts of the Commission, indicates that close attention was given to the recovery of amounts advanced. The work was carried out by the Main Roads Commission during the period July, 1942, to November, 1944.

The assistance of the Accounts Branch was also extended to the Allied Works Council in respect of purchases of plant and the keeping of accounts in connection therewith until December, 1943, when the work was taken over by the Finance Branch of the Council.

The keeping of the accounts of the canteens established through the Civil Constructional Corps camps in Queensland was performed by the Accounts Branch of the Commission until

30th June, 1943, and the initial accounts of the Allied Works Council workshop established at Oonoonba (Townsville) and Stratford (Cairns) were also originally kept by the Commission.

The Accounts Branch of the Commission acted as paying authority in connection with the employment of non-refugee enemy aliens who were engaged under special conditions on Forestry work and road construction. Payments to dependants of these aliens were also made by the Commission.

Finance.

As the majority of works undertaken could not be financed through the Main Roads Trust Fund, arrangements were originally made with the State Treasury for operations to be financed through its Defence Works Trust Fund. However, as other State Government Departments were operating as constructing authorities on behalf of the Commonwealth, and were also using this fund, arrangements were made for the opening of the Main Roads Commission Allied Works Trust Fund at the Queensland Treasury and all subsequent operations for purely Commonwealth works passed through this account.

The Defence Works Trust Fund and the Main Roads Commission Allied Works Council Trust Fund were financed by advances ahead of works from the Commonwealth. All such advances were subsequently cleared.

Construction.

The following is a summary of the expenditure by the Commission on construction and maintenance work in respect of Commonwealth requirements during the period 1st July, 1939, to 30th June, 1946:—

	£
Allied works, comprising aerodromes, roads, gun emplacements, and miscellaneous	11,506,462
Mount Isa-Tennant's Creek road	1,616,500
Commonwealth strategic road construction programme	2,749,825
Commonwealth strategic road maintenance programme	150,308
Employment of non-refugee enemy aliens (other than expenditure included in the Commonwealth strategic road programme)	79,016
Roads, &c., in which the Army and the State were jointly interested—	
Construction	635,903
Maintenance	211,355
Port development work including Cairncross Graving Dock	932,390
Strategic road construction by other authorities for which Main Roads Commission acted as paying authority	456,503
	£18,338,262

The bulk of this expenditure was incurred during the peak construction years 1941-42 to 1943-44. The expenditure by the Commission on permanent works and maintenance during 1938-1939 amounted to roughly £2,200,000. By comparing this with the average rate of expenditure during the above period, some idea is gained of the greatly increased activity.

Administration.

In conformity with an agreement between the Prime Minister and the Premier all existing facilities, including services of the staff, were made available to the Commonwealth without charge, but all additional staff and expenditure becoming necessary through the vast increase on normal Main Roads operations were charged to the Commonwealth. This charge, together with the expenditure by the Commission in connection with payment of salaries of Allied Works Council employees, pending the establishment of Allied Works Council organisations throughout the State, amounted to £737,490. Main Roads permanent staff and existing facilities were utilised practically entirely on the war effort during most of this period.

Other Expenditure.

In July, 1942, the Commonwealth established an Allied Works Council Plant and Materials Trust Account to cover the Allied Works Council's activities in respect of purchase of plant and stores, &c. During the year 1942-43 particularly, the Main Roads Commission acted as the agency of the Commonwealth in respect of the purchase of plant, spare parts and workshop operations in Queensland until such time as the Commonwealth was able to establish its own organisation to take over such matters. The total expenditure on the Allied Works Council's Plant and Materials Trust Account by the Commission was £5,301,001, which was subsequently reimbursed by the Commonwealth.

The activities of the Accommodation Section of the Allied Works Council were to a great extent financed originally by the Commission. An expenditure of £685,192 was incurred in this connection and reimbursed by the Commonwealth.

The Medical Section of the Allied Works Council also was paid for a period by the Commission, together with sundry accounts in connection therewith, resulting in an expenditure of £11,807.

Other charges made to the Allied Works Council were in relation to supplies from the Commission's stores and victualling expenditure incurred in connection with jobs carried out by other constructing authorities than the Main Roads Commission. In this regard an expenditure of £1,146,102 was incurred and reimbursed by the Commonwealth.

The Commission attended to the raising of the hire in respect of Allied Works Council plant from 1941 until the end of 1943, when the records were handed over to the Allied Works Council, which subsequently maintained them.

The Allied Works Council decided that canteens were to be established on a great number of their works for the benefit of the Civil Constructional Corps personnel, and the initial accounting for these canteens was undertaken by the Main Roads Commission. This continued until June, 1943, when Allied Works Council canteen accounts were handed over.

It was decided by the Commonwealth that the services of non-refugee enemy aliens were to be utilised on Commonwealth and Forestry works. The Commission acted as the employing and paying agency in respect of most of these. Provision was also made for the payment of allotments from the earnings of the aliens to their wives and families.

Deficiencies and Irregularities.

The Commission was singularly fortunate in respect of irregularities of accounting of directly supervised works. The record of thefts and irregularities was very small in proportion to the actual expenditure incurred.

CHAPTER 15.

PHOTOGRAPHIC BRANCH.

The Photographic Branch of the Commission undertook a large volume of work in printing maps, plans, diagrams, and secret documents, and in photographing war projects for the various branches of the Australian and American armed services, the Allied Works Council, the Munitions and other Commonwealth Departments.

The total number of prints done for all departments over a period from 19th March, 1942 to 30th September, 1945 was as under:—

Blue prints (all sizes up to 12 feet by 30 inches)	22,828
Dyline prints (all sizes up to 14 feet by 30 inches)	14,773
Photo. prints (all sizes up to 24 inches by 30 inches)	3,977
Photo. negatives made (all sizes)	517
Prints made from paper negatives supplied from Allied Works Council	10,148
Photostat prints (all sizes)	2,024
Photographic prints	1,842
Contact paper negatives made	761
Photo. stencils made	54
Celluloid transparencies	528

This involved the use of about 5½ tons of paper or about 275,000 yards by 42 inches wide, all of which was sensitized in the Photographic Branch of the Commission by means of equipment constructed in the Main Roads Commission workshop before the war to a design evolved by the Photographer.

In 1942 it was found necessary to increase the floor space of the photographic section to allow increased production and also to accommodate a continuous copying machine (which was installed in November, 1943). As the work was of a large and continuous volume, all available equipment had to be utilised, including printing frames, operating in daylight, continuous copying machine, also standing arc lamps coupled to printing frames.

Allied Works Council.

At the request of the Deputy Director-General of Allied Works (Mr. J. R. Kemp), a two-hourly delivery service between the Main Roads Commission and the above Department was instituted, so that there would be minimum time losses with prints required for important defence work.

Very large jobs involving hundreds of prints took sometimes four to eight hours to complete and went back on the first delivery after completion. Quite a lot of jobs involved the making of 500 to 800 prints; Oakey Aircraft Works was an example. Considerable numbers of photographs were taken for the Allied Works Council of work under construction and completed. Fifteen inch by twelve inch enlargements were made chiefly for record purposes.

American Army.

The work for the American Army consisted of reproducing graphs and templates on celluloid for artillery and aerial bombing. These had to be made with the greatest of accuracy. The American Army technicians had been previously engraving the graphs on celluloid to avoid expansion or contraction. On discussion with their artillery and other experts, it was agreed to make a trial by our method by which the graph diagram was exposed on to the celluloid by light through a negative (celluloid positive method). A negative had first to be made from their paper original drawing with the greatest of accuracy allowing for contraction on drying. The negative was then exposed by light on to the sensitised celluloid film, processed, washed, and dried. All stages of the work had to be rigidly controlled, particularly temperature of the wash water and time of washing. Each transparency had to be washed separately in a sink in which temporary partitions had been installed, thus preventing abrasion or mechanical damage. These transparencies were used extensively for artillery and aerial bombing and, it is understood, proved highly successful.

Australian Army.

Work carried out for 1 Aust. C.E. Works consisted mainly of photographic reproduction to reduced scale of plans of all military camps, army buildings, and apparatus. Contact blue prints and dyeline prints were also made. Original plans, &c., were usually brought by a despatch rider with the necessary instructions enclosed.

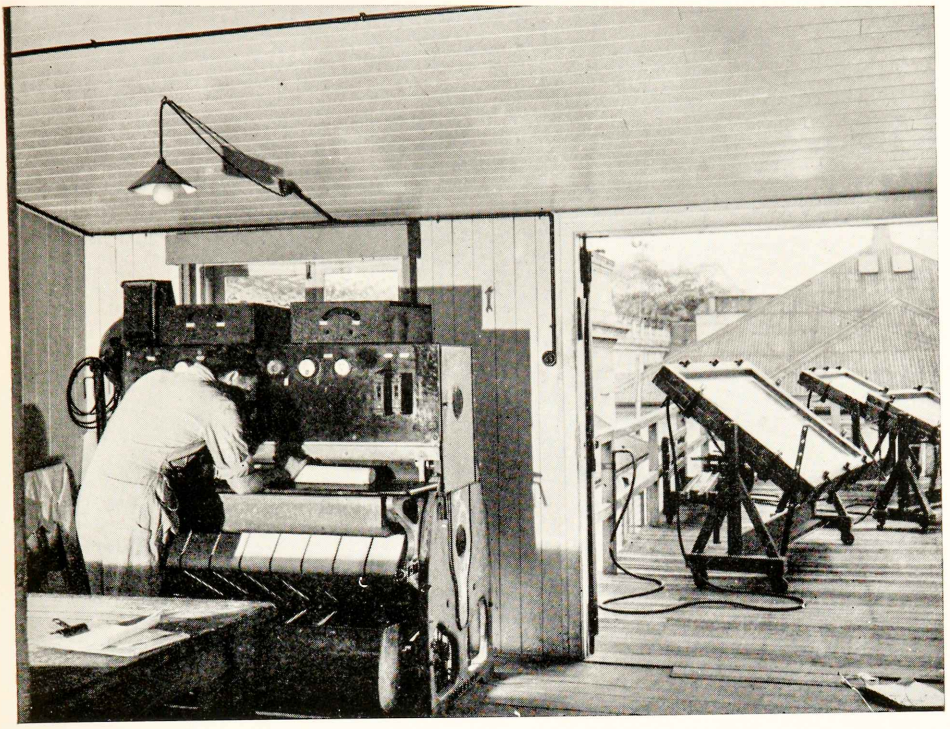
Work for 2 Aust. C.E. Works consisted of making photo prints, blue and dyeline contact or photostat prints of military camps, installations, survey plans, maps, charts, &c. These were brought by a regular uniformed messenger, who quite often waited whilst the work was carried out.

The work for the Allied Geographical Section consisted of reproduction, usually by photo or photostat of operational areas. Almost the whole of the Phillipines and the China Coast area was reproduced by the Main Roads Commission Photo Section prior to the invasion of the former. Several key plans (without the cipher code) of the landing operations at the Phillipines were also reproduced.

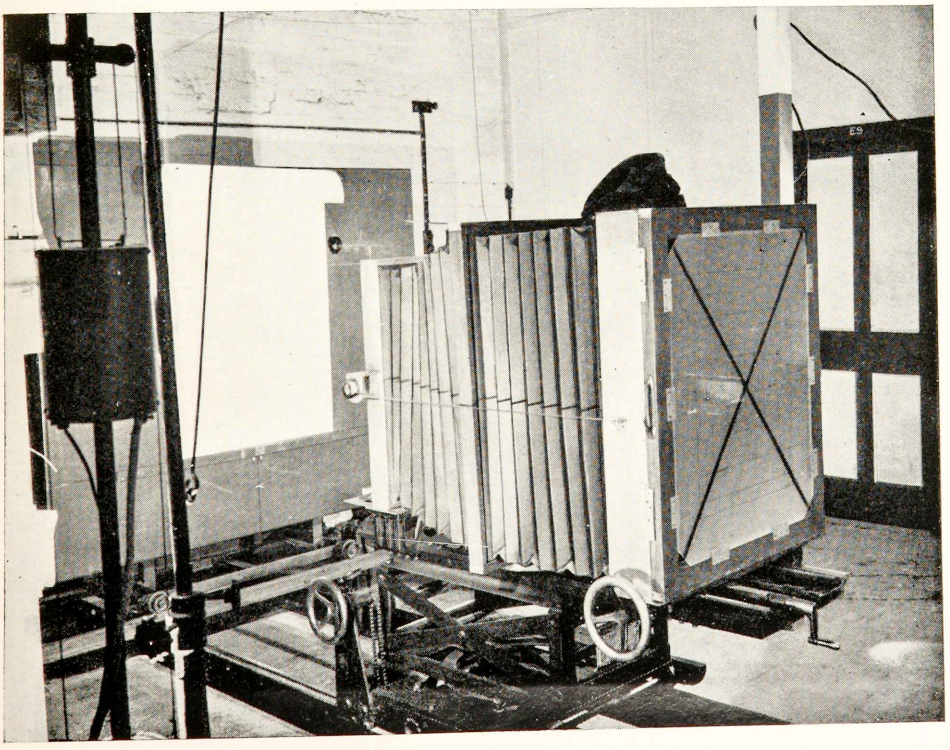
Work for Advanced Headquarters involved the reproductions of maps, plans, &c., of operational areas by photo, photostat, blue and dyeline printing, also the making of celluloid templates for aerial mapping, similar to those made for the American Army.

Royal Australian Navy.

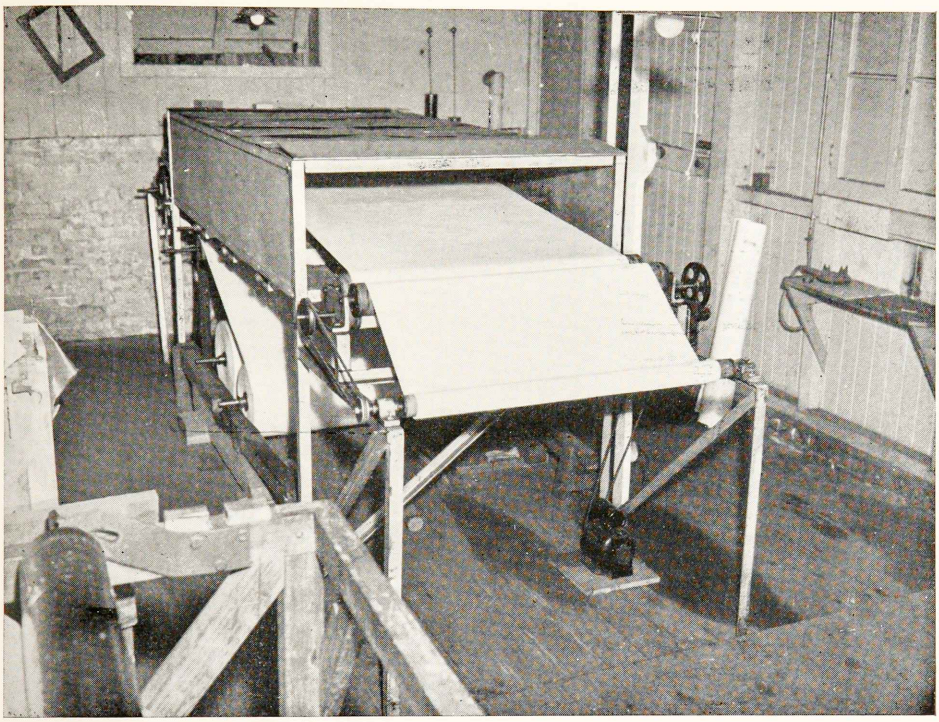
Secret documents were brought by a responsible officer of the Intelligence Section and a careful watch was kept whilst the reproductions were made. Usually these were done by the photostat method, as no negative is made, and consequently no record left behind. Any spoilt prints or test exposures were burnt in the presence of the officer or taken away.



Sun Printing Frames and Contact Copier.



Enlarging Camera.



Paper Coating Machine.

Volunteer Defence Corps.

The work from this Department was brought by their own special messenger, and consisted of reproduction by photo of large illustrations for lecture purposes. A large number of Gestetner films of bombs and guns were also made for the latter purpose. The prints from the stencil films were printed by the V.D.C. themselves at their Creek Street headquarters.

Other Commonwealth Departments.

(*a*) *Ministry of Munitions*—Reproductions were made of plans of heavy tool and munition making machines, boats, cranes, &c., by photo, photostat, blue and dyeline printing. Plans were brought by special messenger and picked up when complete.

(*b*) *Commonwealth Marine Engine Works*—This Department would arrange by phone to send their work in by special messenger. This consisted of plans, tracings, &c., of marine engines, winches, &c., and involved the making of hundreds of photo prints, blue prints, dyeline prints, and enlargements from rolls of 35 mm. film. It is usual for submarines to carry the plans of their engines, &c., by this method.

(*c*) *Rocklea Munition Works*—The work for this Department consisted chiefly of taking photos of machines and operations and also publicity photographs. Some developing and printing work was also undertaken.

(*d*) *Commonwealth Housing Commission*—Extensive photo work was carried out for this Department. All types of houses under construction and complete, the housing scheme at Beaudesert road and the Rocklea hut scheme were photographed, interiors and exteriors of dining hall, cafeteria, and living quarters being taken.

State Departments.

(*a*) *Bridge Board—Bureau of Industry*—This Department was designing and constructing gun emplacements, forts, &c., and all necessary plans in connection with same were brought by their messenger, who, in quite a lot of cases, waited whilst they were made. These mostly consisted of photostats, blue and dyeline prints, some of the latter 50 inches by 30 inches.

(*b*) *Stanley River Works Board—Bureau of Industry*—General reproductions of plans and photographs were made for this Department, but not to any large extent.

Main Roads Commission Activities.

Concurrently with the work for outside authorities, the reproduction of all plans, maps, tracings, and photographs had also to be carried out for the Commission's own activities, including many of the defence works entrusted to it. This involved photo reproductions and contact prints of roads, bridges, aerodromes, wharves, forts, &c.

A documentary film in Kodachrome and a still photo record of the building of the Brisbane Graving Dock at Cairncross was made and some 200 still photographs were taken over the period of its construction. About 1,000 feet of Kodachrome film were exposed at a time when this film was at a premium and censorship was very strict. Every shot had to be carefully considered to avoid waste. Descriptive titles had to be written, filmed, developed, and spliced into their respective places on this film to make the record complete.

CHAPTER 16.

RECORDS.

Up to 1942 work in the Records Section had not greatly increased, but from April, 1942, on, a big rush was experienced. It was then necessary to compile a complete record system to be used, in addition to the Main Roads standard system, to accommodate the various activities caused by the war. The system was subdivided into Administrative, Construction, Mechanical Equipment and Materials, Civil Constructional Corps operations and Alien Control.

When the Civil Constructional Corps came into force the staff concerned was first accommodated in the Main Roads Commission building and, during that stage, assistance was rendered in installing a record system which was ultimately used to cover the activities of the corps, and to keep track of personnel, the bulk of the Allied Works Council correspondence being filed in this building. In February, 1943, many of the files, together with a section of the Records staff (ten in all), were transferred to Allied Works Council headquarters in Queen street, to control the administrative records. However, the control of job records was continued in this building. In February, 1944, when the Mechanical Equipment Section, which recorded the purchase, impressment, and location of plant, was transferred to Allied Works Council headquarters, the Commission provided the records clerk and staff.

The Commission was one of the largest constructing authorities for the Allied Works Council, and required a comprehensive system within the Main Roads system to handle the huge construction works and keep records of the personnel. The system had to be such that it would cover accounts, plant, and material purchases and transfers, liaison with other Departments, the use of Civil Constructional Corps personnel and aliens. It is considered that during the period of operation 150,000 letters were dealt with, which required the services of ten officers. As the Commissioner of Main Roads also held office as Director of Emergency Road Transport, records relating to these activities were kept, also the required records concerning the Liquid Fuel Control Board.

The two-digit automatic telephone system which had been installed for Main Roads Commission use and operated by one girl was very satisfactory. This system could not handle the business once the Allied Works Council started to function, and was replaced by a three-digit system. Originally 58 extensions were used for Main Roads Commission work, and these had to be increased to 156, with the result that a second switch operator had to be employed.

APPRECIATION.

From Headquarters Sub-Base Three, Australian Base Command under date, 21st June, 1946, the following letter was received by the Main Roads Commissioner, Mr. J. R. Kemp:—

Dear Sir,

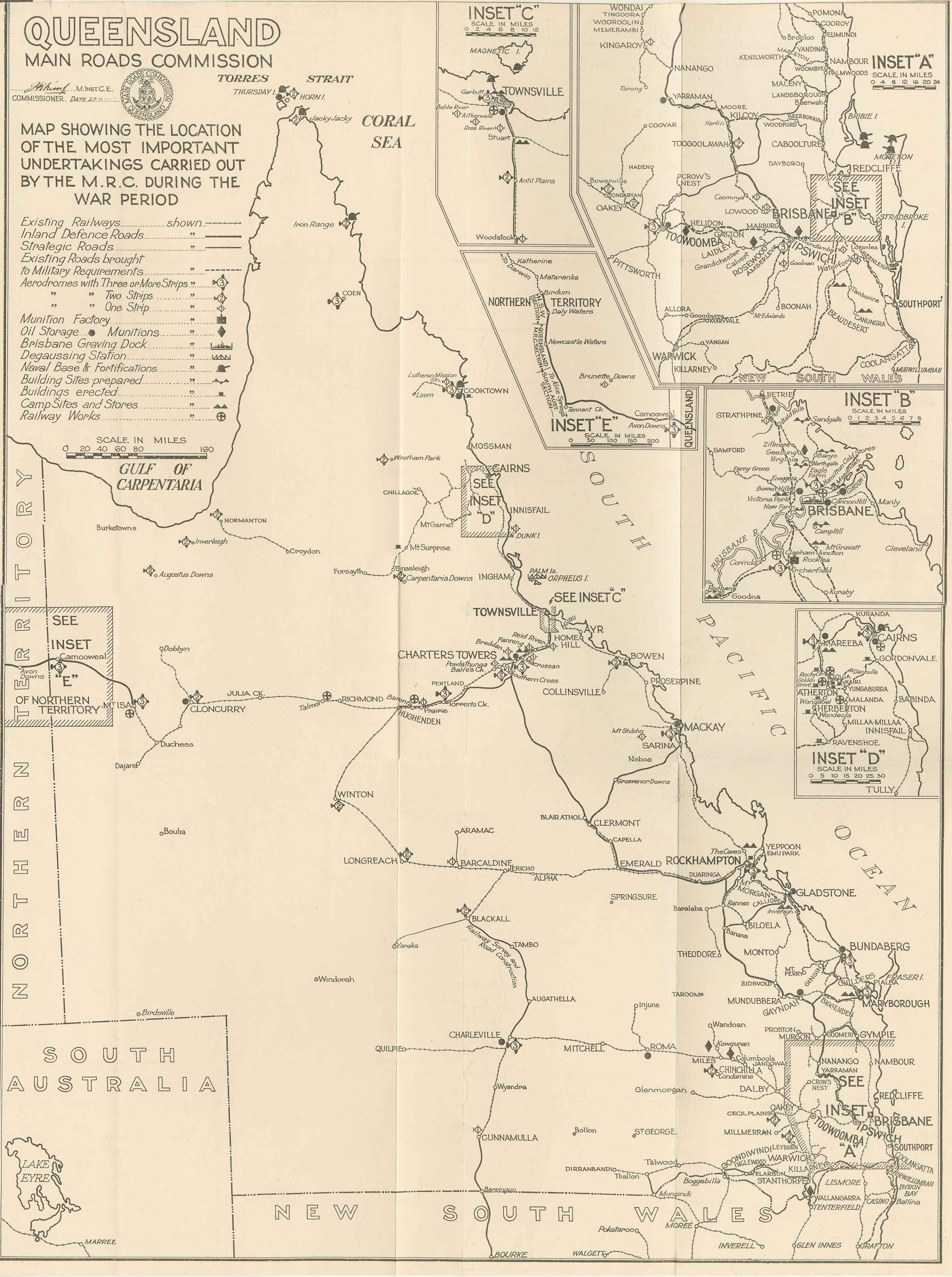
In view of the imminent termination of base operations in Brisbane, I would like to seize this opportunity to express our sincere appreciation for the co-operation and friendly assistance rendered by you and your staff to the United States Army over the difficult years just passed.

We have had cause to be proud of the accomplishments of our Brisbane base. This pride can be only a reflection of the pride and satisfaction you can feel in the accomplishment of a job well done. Your standard has been among the highest of those displayed by a gallant ally.

You may rest assured that although our departure may terminate actual business association, the spirit of friendliness, co-operation, and hospitality we encountered, will in future years be synonymous with the mention of Australia.

Sincerely,

(Sgd.) E. H. HAUSCHULTZ,
Lt. Colonel, Inf.
Commanding.


QUEENSLAND
MAIN ROADS COMMISSION
M.INST.C.E.
COMMISSIONER. DATE 23
MAIN ROADS COMMISSION QUEENSLAND
MAP SHOWING THE LOCATION OF THE MOST IMPORTANT UNDERTAKINGS CARRIED OUT BY THE M.R.C. DURING THE WAR PERIOD
Existing Railways shown
Inland Defence Roads "
Strategic Roads "
Existing Roads brought to Military Requirements "
Aerodromes with Three or More Strips "
" " Two Strips "
" " One Strip "
Munition Factory "
Oil Storage Munitions "
Brisbane Graving Dock "
Degaussing Station "
Naval Base & Fortifications "
Building Sites prepared "
Buildings erected "
Camp Sites and Stores "
Railway Works "
SCALE IN MILES
0 20 40 60 80 160
GULF OF CARPENTARIA
TORRES STRAIT
THURSDAY I.
HORN I.
Jacky Jacky
CORAL SEA
Iron Range
COEN
Lutheran Mission Stn.
Laura
COOKTOWN
MOSSMAN
Wrotham Park
CAIRNS
SEE INSET "D"
CHILLAGOE
INNISFAIL
Mt Garnet
DUNK I.
Mt Surprise
Einasleigh
Forsayth
Carpentaria Downs
INGHAM
PALM Is.
ORPHEUS I.
SEE INSET "C"
TOWNSVILLE
GIRU
AYR
HOME HILL
Reid River
Fanning
Breddan
CHARTERS TOWERS
Powlathunga
Balfe's Ck.
Macrossan
Southern Cross
BOWEN
PROSERPINE
COLLINSVILLE
NORMANTON
Burketown
Inverleigh
Croydon
Augustus Downs
SEE INSET "E" OF NORTHERN TERRITORY
Camooweal
Avon Downs
MT ISA
Dobbyn
JULIA CK.
CLONCURRY
Duchess
Dajarra
Talmoi
RICHMOND
Baronta
Prairie
Torren's Ck.
PENTLAND
HUGHENDEN
Mt St.John
MACKAY
SARINA
Nebo
Grosvenor Downs
WINTON
Boulia
BLAIR ATHOL
CLERMONT
CAPELLA
ARAMAC
LONGREACH
BARCALDINE
JERICHO
ALPHA
EMERALD
ROCKHAMPTON
The Caves
YEPPOON
EMU PARK
DUARINGA
MT MORGAN
GLADSTONE
SPRINGSURE
Baralaba
Rannes
CALLIOPE
Inveragh
BILOELA
Banana
BLACKALL
Railway Survey and Road Construction
Yaraka
TAMBO
THEODORE
MONTO
BUNDABERG
MT. PERRY
GINGIN
CHILDERS
FRASER I.
PIALBA
EIDSVOLD
MARYBOROUGH
MUNDUBBERA
GAYNDAH
BIGGENDEN
Windorah
TAROOM
Injune
AUGATHELLA
Birdsville
Wandoan
PROSTON
MURGON
GOOMERI
GYMPIE
CHARLEVILLE
QUILPIE
MITCHELL
ROMA
Kowguran
Columboola
MILES
JANDOWAE
CHINCHILLA
Condamine
NANANGO
YARRAMAN
NAMBOUR
SEE INSET "A"
CROW'S NEST
REDCLIFFE
Wyandra
Glenmorgan
DALBY
OAKEY
CECIL PLAINS
BRISBANE
IPSWICH
TOOWOOMBA
MILLMERRAN
LEYBURN
SOUTHPORT
CUNNAMULLA
Bollon
ST GEORGE
GOONDIWINDI
INGLEWOOD
WARWICK
KILLARNEY
COOLANGATTA
Talwood
DIRRANBANDI
Thallon
Boggabilla
YELARBON
STANTHORPE
LISMORE
MURWILLUMBAH
BYRON BAY
Barringun
Mungindi
WALLANGARRA
CASINO
Ballina
TENTERFIELD
MOREE
Pokataroo
INVERELL
GLEN INNES
GRAFTON
BOURKE
WALGETT
NORTHERN TERRITORY
SOUTH AUSTRALIA
LAKE EYRE
MARREE
NEW SOUTH WALES
SOUTH PACIFIC OCEAN
INSET "C"
SCALE IN MILES
0 2 4 6 8 10 12
MAGNETIC I.
Garbutt
TOWNSVILLE
Bohle River
Aitkenvale
Ross River
Stuart
Antil Plains
Woodstock
INSET "E"
SCALE IN MILES
0 50 100 150 200
Katherine
To Darwin
Mataranka
Birdum
NORTHERN TERRITORY
Daly Waters
N.S.W. SECTION
QUEENSLAND M.R.C. SECTION
SOUTH AUST. SECTION
Newcastle Waters
To Alice Springs
Brunette Downs
Tennant Ck.
Camooweal
Avon Downs
QUEENSLAND
INSET "A"
SCALE IN MILES
0 4 8 12 16 20 24
WONDAI
TINGOORA
WOOROOLIN
MEMERAMBI
KINGAROY
NANANGO
Tarong
YARRAMAN
MOORE
KILCOY
Harlin
COOYAR
TOOGOOLAWAH
HADEN
CROW'S NEST
Bowenville
JONDARYAN
OAKEY
TOOWOOMBA
HELIDON
GATTON
LAIDLEY
Grandchester
Calvert
ROSEWOOD
AMBERLEY
IPSWICH
Bundamba
Goolman
PITTSWORTH
Coominya
LOWOOD
MARBURG
BRISBANE
SEE INSET "B"
POMONA
COOROY
EUMUNDI
Brooloo
YANDINA
MAPLETON
KENILWORTH
NAMBOUR
WOOMBYE
PALMWOODS
MALENY
LANDSBOROUGH
Beerwah
BEERBURRUM
WOODFORD
CABOOLTURE
BRIBIE I.
DAYBORO
MORETON I.
REDCLIFFE
STRADBROKE I.
Loganlea
BEENLEIGH
Waterford
Tamborine
SOUTHPORT
CANUNGRA
BEAUDESERT
BOONAH
Mt Edwards
ALLORA
Goomburra
MARYVALE
YANGAN
WARWICK
KILLARNEY
COOLANGATTA
MURWILLUMBAH
NEW SOUTH WALES
INSET "B"
SCALE IN MILES
0 1 2 3 4 5 6 7 8
PETRIE
STRATHPINE
Bald Hills
Sandgate
SAMFORD
Zillmere
Geebung
Virginia
Banyo
Northgate
Eagle Farm
Hamilton Cold Stores
Meeandah
GIBSON I.
Ferny Grove
Enoggera
Bowen Hills
Victoria Park
New Farm
Cannon Hill
Manly
BRISBANE
BRISBANE R.
Camp Hill
Mt Gravatt
Cleveland
Clapham Junction
Rocklea
Corinda
Archerfield
Redbank
Goodna
Kuraby
INSET "D"
SCALE IN MILES
0 5 10 15 20 25 30
KURANDA
CAIRNS
MAREEBA
GORDONVALE
Rocky Ck.
Golden Grove
TOLGA
KAIRI
Danbulla
ATHERTON
YUNGABURRA
MALANDA
BABINDA
Wongabel
HERBERTON
Wondecla
MILLAA-MILLAA
INNISFAIL
RAVENSHOE
TULLY

INDEX TO MAIN ROADS COMMISSION WAR HISTORY.

A. H. TUCKER, Government Printer, Brisbane.